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DECEMBER, 1944

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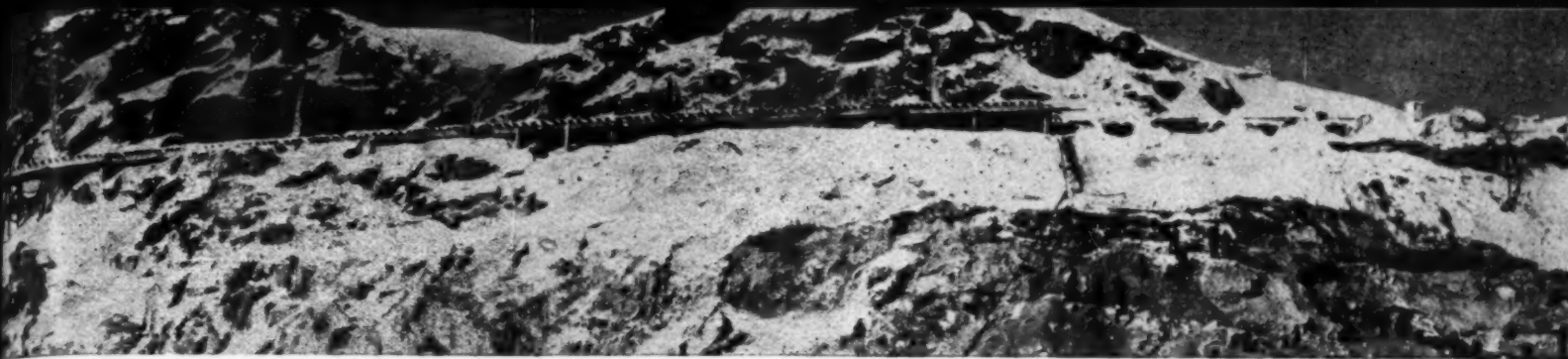
TUNE IN THE TEXACO STAR THEATRE WITH JAMES MELTON SUNDAY NIGHTS ★ METROPOLITAN OPERA BROADCASTS SATURDAY AFTERNOONS

DIESEL PROGRESS, for December, 1944. Volume X, Number 12. DIESEL PROGRESS is published monthly by Diesel Engines, Inc., 2 West Forty-fifth St., New York 19, N. Y. Rex. W. Wadman, President. Acceptance under the Act of June 5, 1943, at East Stroudsburg, Pa., authorized March 27, 1940. Subscription rates: \$5.00 per year, single copy, 50c.

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FRONT COVER ILLUSTRATION: Scene in the South Norwalk, Connecticut municipal power plant as the latest Nordberg Diesel was started up.

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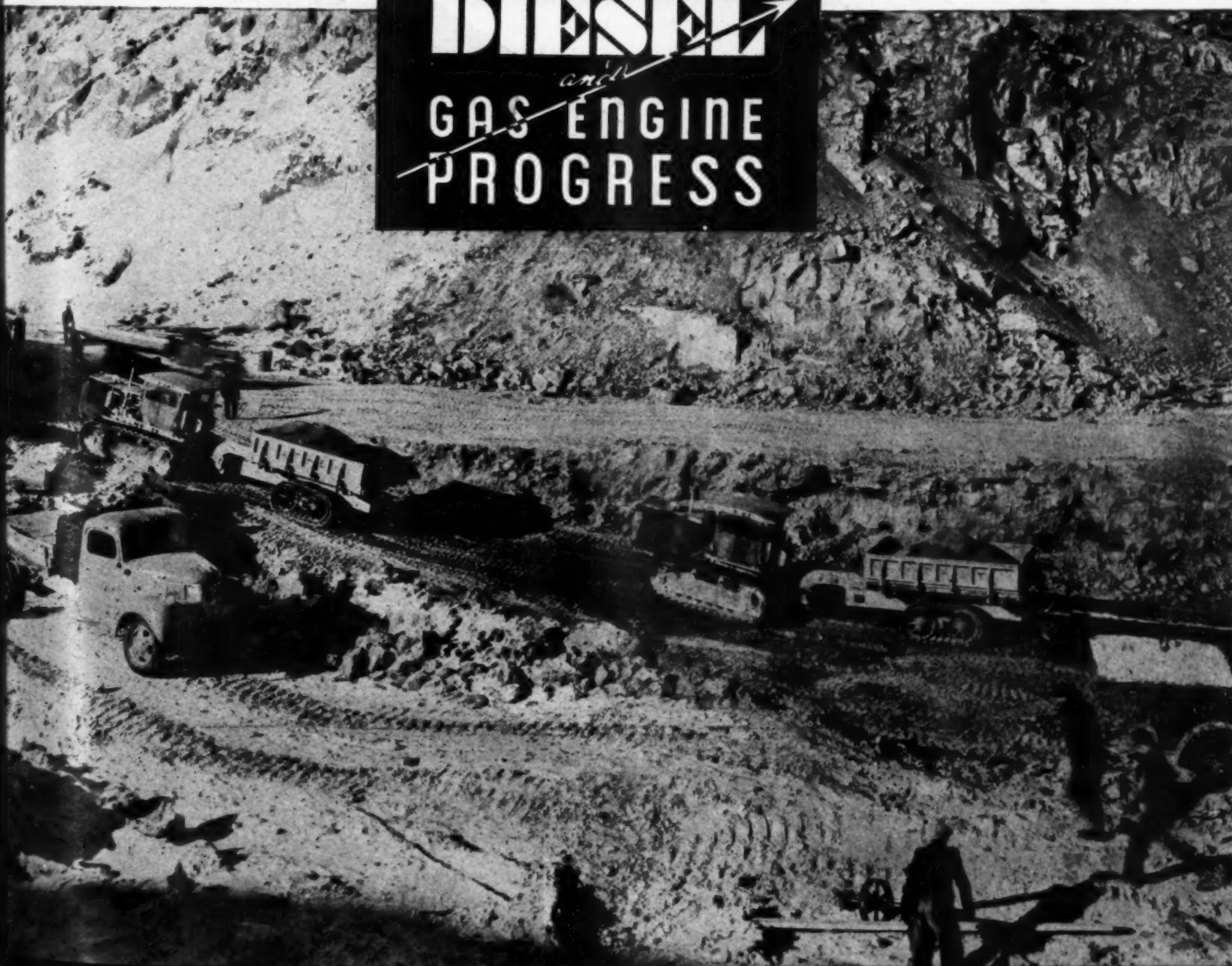
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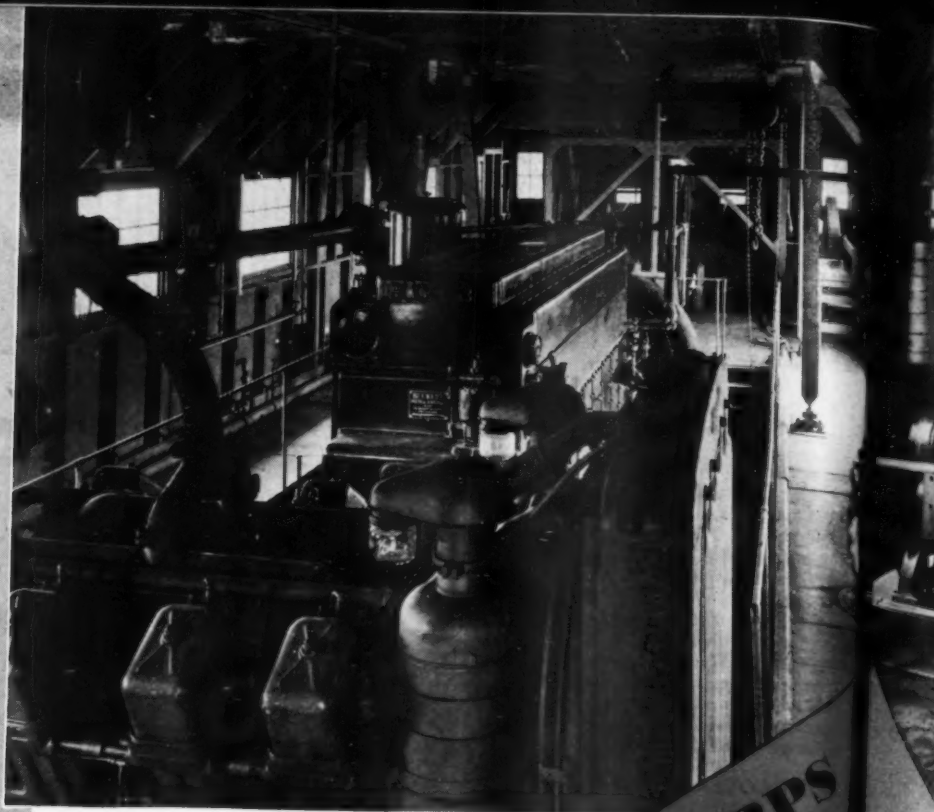
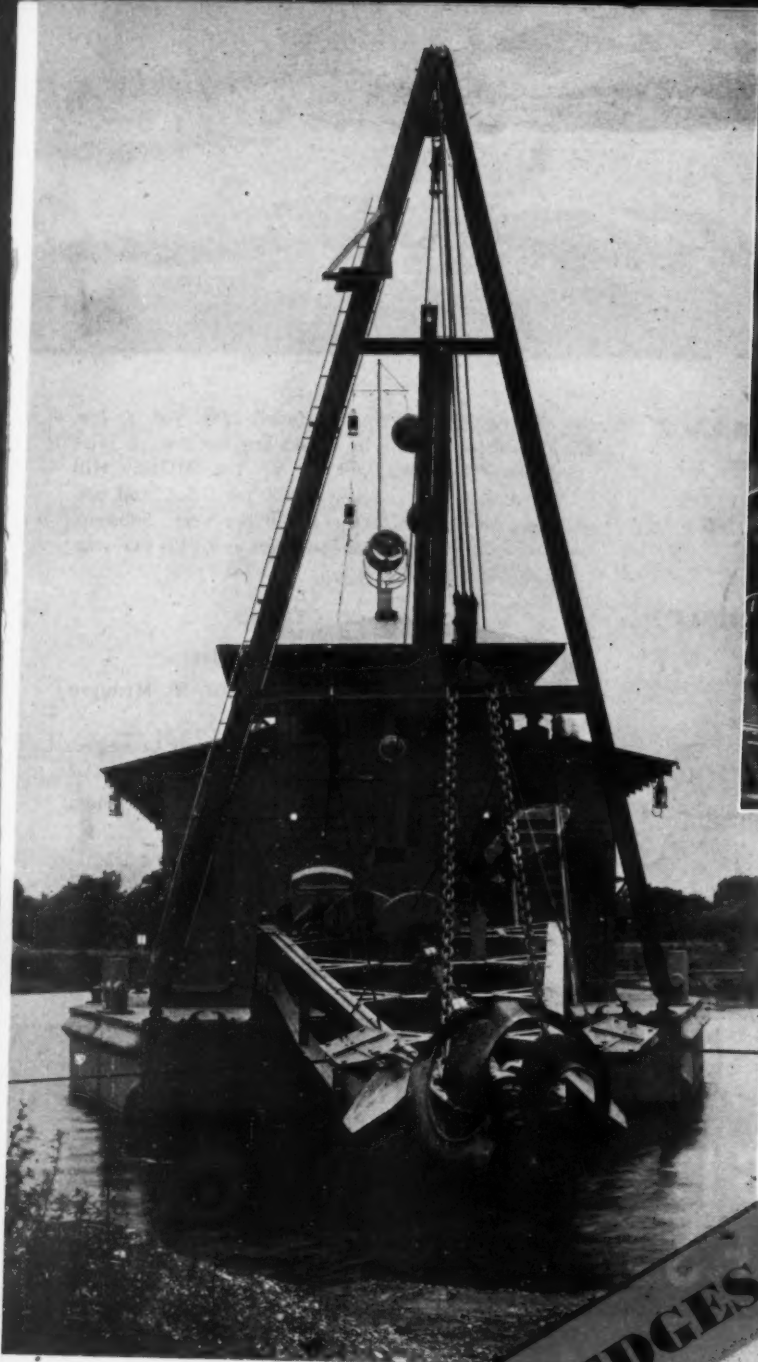
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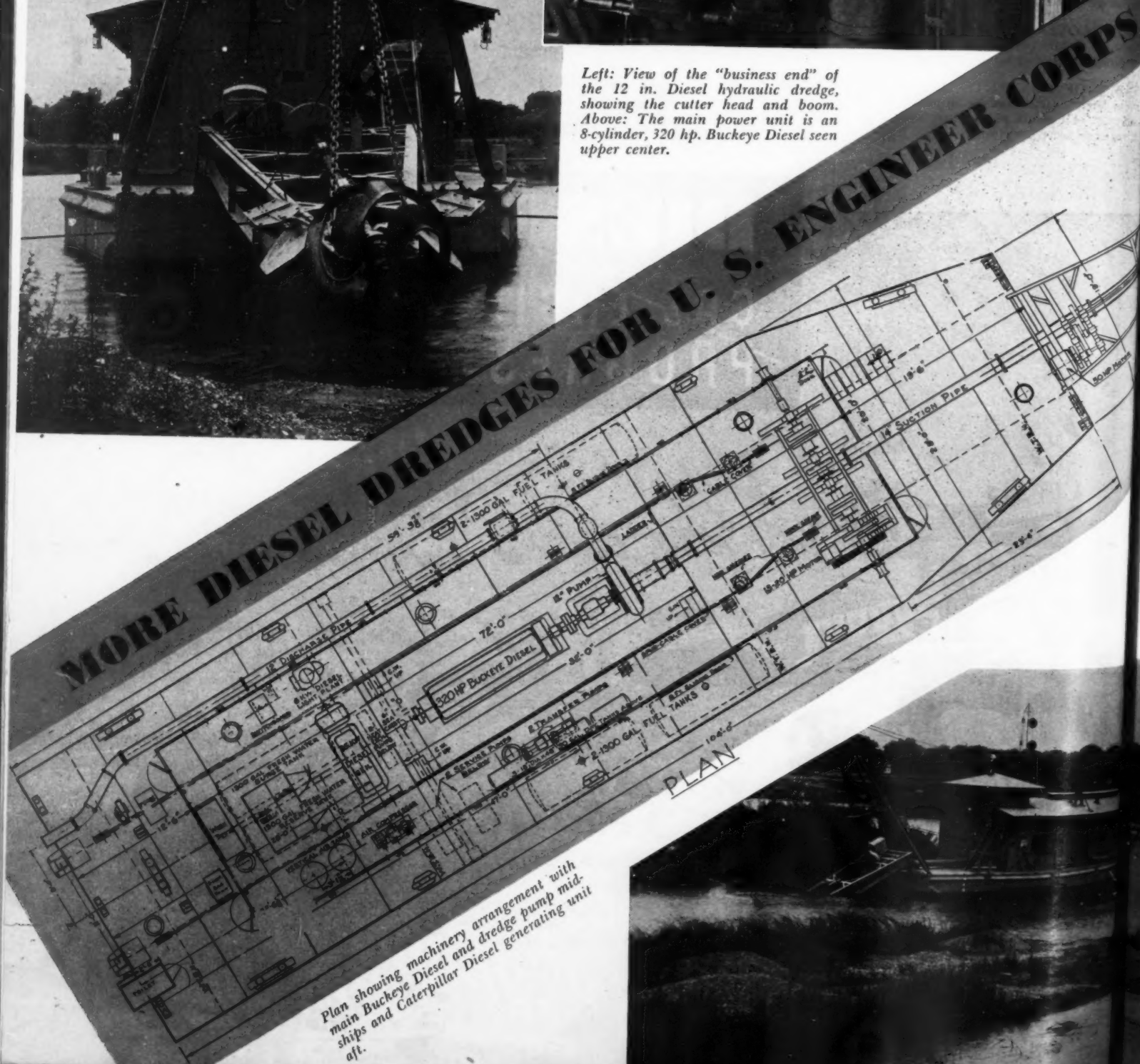
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DIESEL and GAS ENGINE PROGRESS





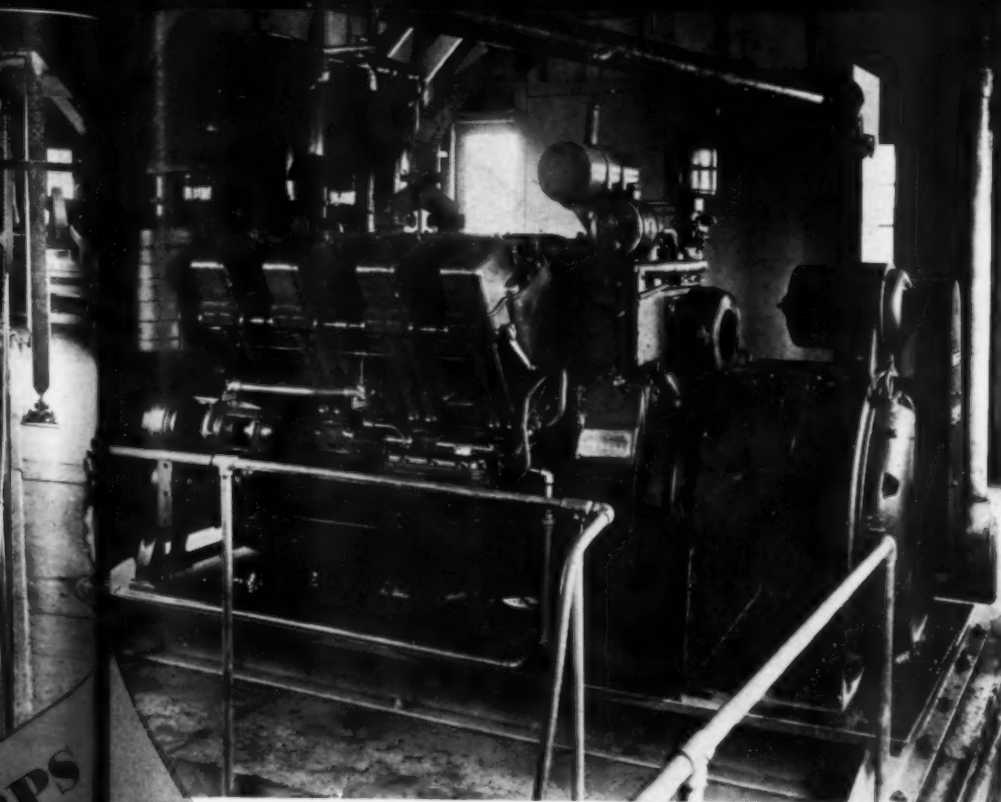
Left: View of the "business end" of the 12 in. Diesel hydraulic dredge, showing the cutter head and boom. Above: The main power unit is an 8-cylinder, 320 hp. Buckeye Diesel seen upper center.



Plan showing machinery arrangement with main Buckeye Diesel and dredge pump midships and Caterpillar Diesel generating unit aft.



By WIL



The Caterpillar Diesel generating set for lighting and general service.

MANY outstanding Diesel dredges have been built for and to the designs of the United States Army Engineer Corps. Some have been described in DIESEL PROGRESS, notably the all steel hopper dredge, *Chester Harding* which appeared in the issue of September 1939. Now comes a group of interesting 12-inch hydraulic dredges entirely Dieselized, completely integrated and fully equipped to operate in isolated locations for long periods. They require no supply service except for fuel oil, lube oil and sustenance for personnel. This is said to be the largest order for hydraulic dredges of identical design and construction ever placed in this country.

By WILL H. FULLERTON

American Steel Dredge Company, Inc. is building a number of these new dredges which are designed to handle sand, clay and silt to a depth of 16-feet and deliver the material through a maximum of 1000-feet of discharge line at water level, or through 500-feet of discharge line at 30-ft. elevation. The main dredg-

ing pump has a 14-in. suction with a 12-in. discharge line and is powered by a Buckeye, eight-cylinder, 320 hp. Diesel engine. This main dredging Diesel dominates the midships machinery space and is direct-connected to the dredge pump through a Falk flexible coupling. A completely self contained unit, the main engine is fitted with Purolator fuel filters, Weston tachometer and Alnor pyrometer. A Maxim exhaust silencer and Air-Maze oil bath intake filter-silencer are fitted and Ross lube and jacket water coolers are engine-mounted. A compact, totally enclosed unit is this main Buckeye Diesel, with cover plates arranged to facilitate removal for inspection of crankcase, valve and fuel injection mechanisms. Fuel injection system is Bendix-Scintilla.

Athwart the centerline, just aft of the main engine is the 85 kw. auxiliary generating set, a Caterpillar packaged unit, powered by a Caterpillar, 8-cylinder, V-type Diesel, mounted on structural units which raise it above the level of engine room deck. This unit is arranged for gasoline engine starting and since there is no shaft generator on the main Diesel, the Caterpillar Diesel-electric set carries the entire electrical load for lighting, service pumps, boom hoist, motors, etc.

For light electrical requirements another auxiliary unit is installed slightly aft and on the port side of the Caterpillar unit. This is a 6 kw. Witte Diesel-electric generator set and it completes the prime mover equipment aboard these new dredges.

The 104 ft. x 29 ft. x 6 ft. prefabricated steel hull is an adaptation of the K-D bolted sectional barge that American Steel Dredge Company has been producing for the Army Transportation Corps. The bolted steel hull permits shipment of the complete dredge, on standard railroad cars and as hold cargo to overseas destinations. In spite of its large size, no deck space is needed for its transportation and no fabrication is necessary at the site of its erection. A wooden deckhouse measuring 72 ft. x 20 ft. x 10 ft. 8 in., enclosing all machinery, is also prefabricated to facilitate shipment. The dredge has a 36 ft. digging ladder provided with an adequate margin of overload capacity and fitted with interchangeable cutter heads to meet the changing character of material encountered on different projects. The unit is equipped with a five-drum hoist which enables extremely high rope pull at low speeds due to special compound gearing. The Unit follows a type which American Steel Dredge Company has been building for 40 years.

One of the dredges built by American Steel Dredge Company, Inc., in operation for U. S. Army Engineer Corps. Note discharge lower right.



DIESELS SPRAY FAMOUS ORCHARDS

By F. HAL HIGGINS

THE famous valley of the Santa Clara, touching San Francisco Bay or the southern edge, produces two-thirds of the world's prunes. Also, a lot of the fancy export pears that used to go to the London and Paris markets before Adolph kicked over his paper-hanger's paste pot and brought the roof down on the world and himself. It's Anjous, Comise and other fancy pears have a reputation around the globe. And its apricots were right up there, too. In fact, nursery historians credit this Santa Clara valley for starting most of the famous dediduous fruit orchards of the Golden State, starting with the pioneer settlers who came in on the heels of the Gold Rush.

But the Santa Clara Valley is also famous for starting many modern farm machine ideas. The idea of spraying machines to fight bugs, worms and such pests off fruit trees to give the consumer a perfect fruit on the market also originated in this valley, not ten miles from the scene of our hero of this story. This was the work of a retired pump builder from Ohio named Bean, who was ordered out to California for his health towards the end of his life. He found his almond trees looked sick one morning, and by the time he had made himself a pressure pump to throw tobacco juice, whale oil and such pest killers of the day on his trees, his neighbors wanted similar spray pumps and he began building them.

Today, with the San Francisco Bay area one of the most critical in skilled men and the war materials and men being funneled out through the harbor to the South seas and the Orient, men for orchard sprayer work are getting \$1 an hour. So, the orchardists who have to do a lot of spraying—pears get six to seven sprays, once every two weeks almost throughout the fruit setting and growing season—are hard put



The driver of this Caterpillar Diesel tractor controls the revolving spray nozzles from his seat, playing the spray on the tree until it is thoroughly saturated, then moves on to the next one.

Spraying both sides of a tree row. The nozzles swing up and down as they revolve so that spray reaches every part of the trees.





to find men for the job. G. L. Dale, mechanic in charge of the Caterpillar Diesel fleet of the Losse orchards near Mt. View, began figuring out his one-man tractor spraying outfit three or four years ago. Last year, he had it working and this year it is perfected and the neighbors are installing them. When Losse's fleet of three Caterpillar Diesels was caught in the apricot orchard the other day, the Dale idea was working and saving six men, two on each sprayer. That's \$6 an hour, or \$54 a day, as they work 9-hour days when the weather permits. Rains and high winds stop the spraying, of course.

But that's small money compared to the Block orchard where he operates a fleet of five Caterpillar Diesel tractors and had been using 5-man crews. That orchard was saving \$20.00 an hour, or \$180.00 a day!

"This is one invention that really works," declared Mr. Losse, whom we met as we were packing the camera to leave. "I've 440 acres of

apricots and pears in the two orchards this year. The pears get six or seven sprays a season, every two weeks through much of the year, as we fight the various pests."

Mr. Dale posed on the tractor for a special picture for Diesel Progress. He has applied for patent on the sprayer arrangement but has not got around to it for the clutch-slipper on the tractor. The Diesel tractor driver has a pair of small ropes or cables from his seat to the sprayer nozzles. These permit him to open or shut either or both nozzles as wanted for last row work and turning at the ends. He throws out the Cat's side clutches with his special lever attachment in front of him. Thus the one man on the tractor does all the work formerly done by three to five men—and does a better job, says Mr. Losse. He saves spray material, time, men and money. In fact, he probably keeps the orchard owner from going into the red in these days of ceilings, high harvest labor and truck, men and machine shortages.

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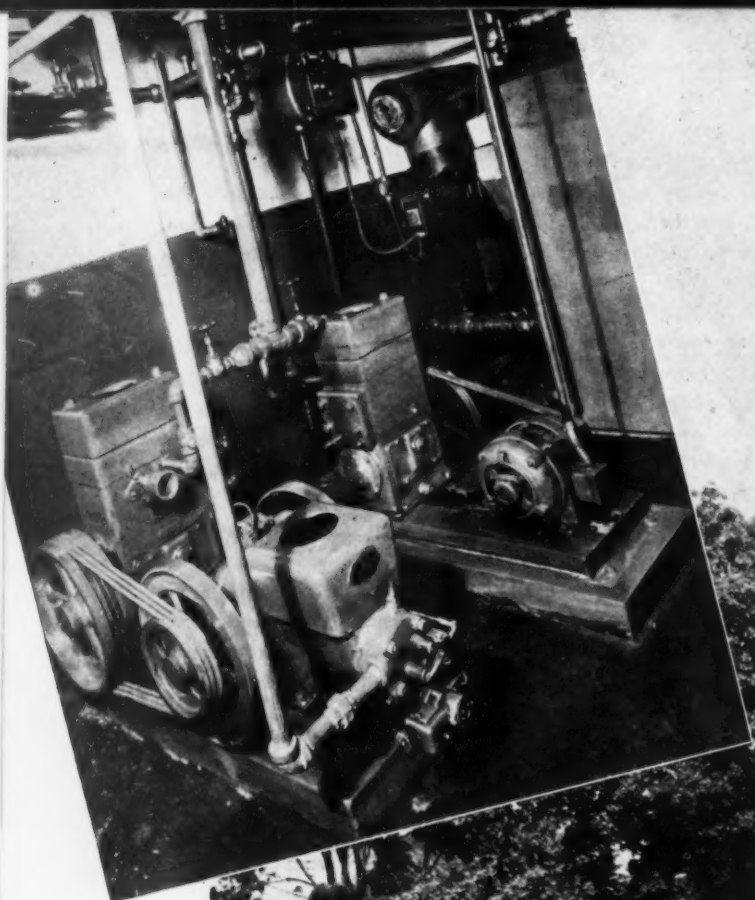
Moving the outfit into position, the driver throws out side clutches to halt tractor's forward progress while power take-off operates sprayer.

Below: G. L. Dale, mechanic in charge of the fleet of Caterpillar Diesel tractors in the famous Losse apricot and pear orchards near San Jose, California, demonstrates his tractor clutch release.

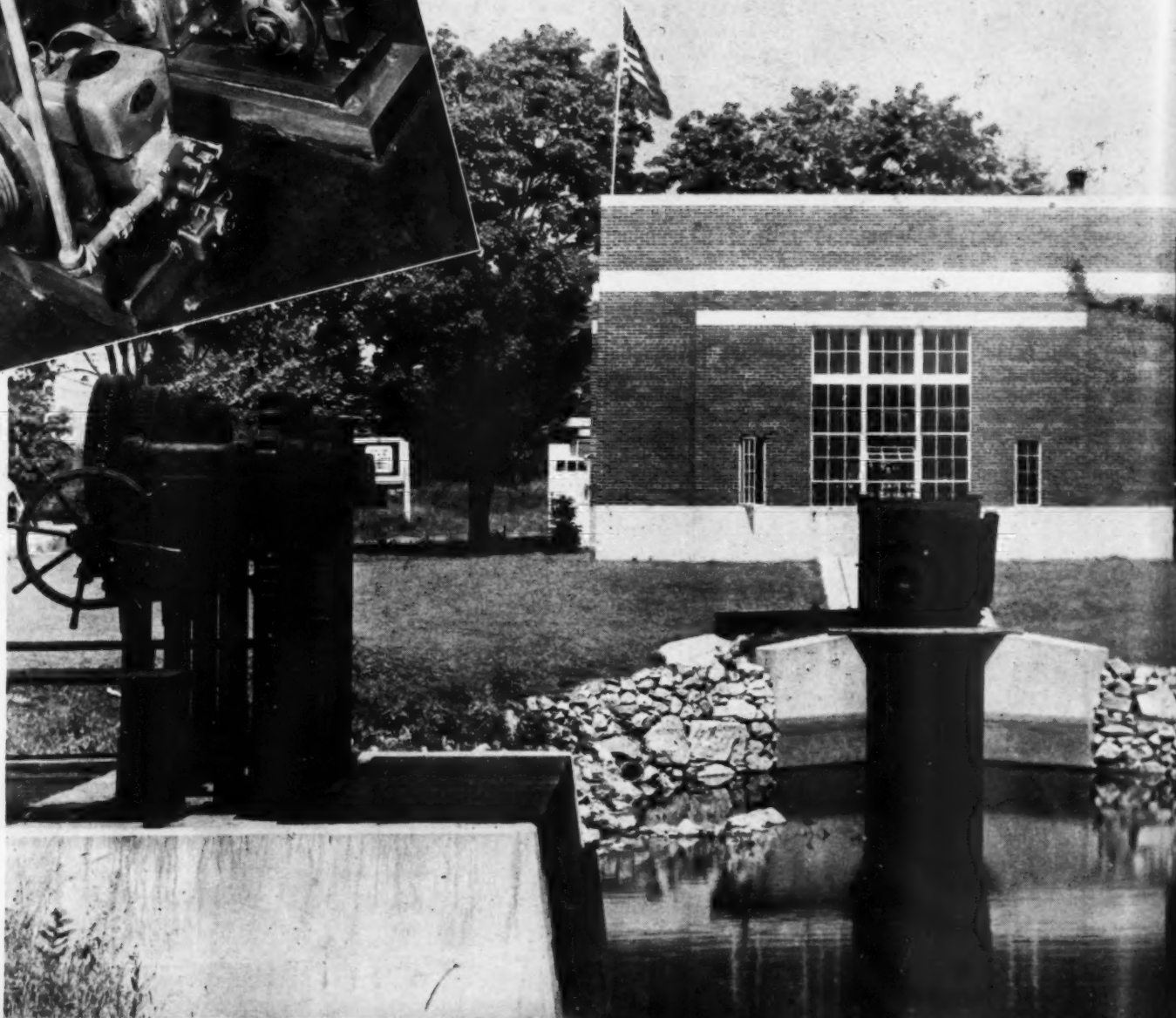


FALL RIVER INDUSTRIES SAVED BY DIESELS

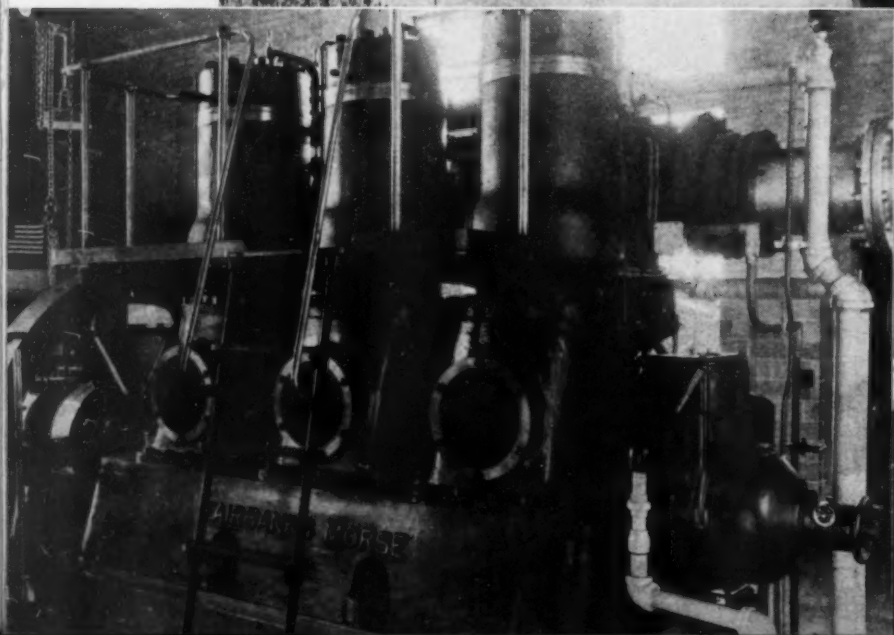
By JOHN B. HOGAN



Ample starting air is assured by the dual F-M compressors, shown above, one motor-driven, the other gasoline engine-driven.



Rear end view of the Noquochoke pumping station, Fall River, Massachusetts, showing the water intake.



Close up view of one of the Fairbanks-Morse 1-cylinder, 225 hp. Diesel pumping engines.

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WAR seemed far removed from the verdant New England country-side on this hazy July afternoon as we stood on the banks of Noquochoke Reservoir, just a few minutes from the grim clatter of the over-worked textile industries of Fall River, Massachusetts. Only the steady throb of the Fairbanks-Morse Diesels and the constant swish of churned water reminded us that in the little red-brick building on the banks of that peaceful pond the war was also being fought; fought not with bullets and bayonets but with water.

Water to slake the thirsty mouths of Fall River's hard-pressed textile mills, busily turning out millions of yards of all sorts of cloth to shelter, clothe and protect the lives of members of our Armed Forces and for countless essential civilian uses.

Water to supply the pounding steam engines of factories such as the Firestone Rubber Company, hard at work making fabrics for use in tires for jeeps, half-tracks, Army trucks and necessary civilian vehicles.

Water became a precious commodity when the war brought new problems to Fall River as it did to every other industrial city. Those first grim days after Pearl Harbor, when the textile plants were forced to step up production far beyond normal limits, saw the city's industrial water supply at South Watuppa Pond drop to an alarmingly low level. Prior to construction of the new station, both South Watuppa and North Watuppa, site of Fall River's domestic pumping station were fed by a common watershed. Lack of rain and the speeding up of war production combined to over-tax the facilities at South Watuppa. Some plants were forced to stop production of critical war materials as the industries' life-blood started to run out. The need for a transfusion was imperative.

Economy and dependability of Diesel operation was the answer. The government recognized the acuteness of the problem and priorities for construction of a pumping station and installation of Fairbanks-Morse Diesels and pumps were readily granted.

The station was constructed on the banks of what is now known as Noquochoke Reservoir but what was formerly just a large pond fed by a 27 square-mile water-shed. The need was for pumps capable of delivering 20 mgd. against a 93 foot working head to augment the failing supply at South Watuppa and for Diesels to drive those pumps. Machinery selected were two Fairbanks-Morse, 3 cylinder, 225 horse-



General station view showing the two identical F-M Diesels and 16 in. centrifugal pumps of 6900 gpm. capacity each.

The Westinghouse engine and pump control panel.

power, 300 rpm. Diesel engines, connected through speed-increasing gears to two Fairbanks-Morse 16 in., bottom suction, centrifugal pumps with capacities of 6900 gpm. each at rotative speeds of 635 rpm. to augment the industrial water supply with 20 m.g.d.

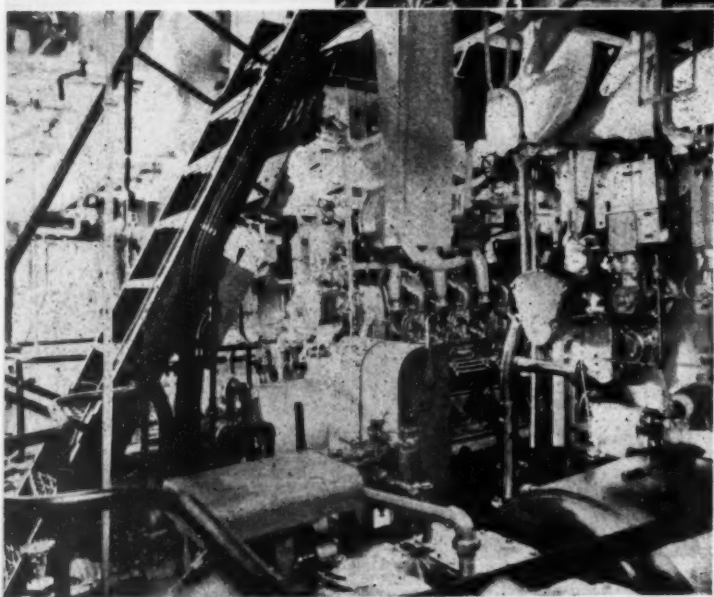
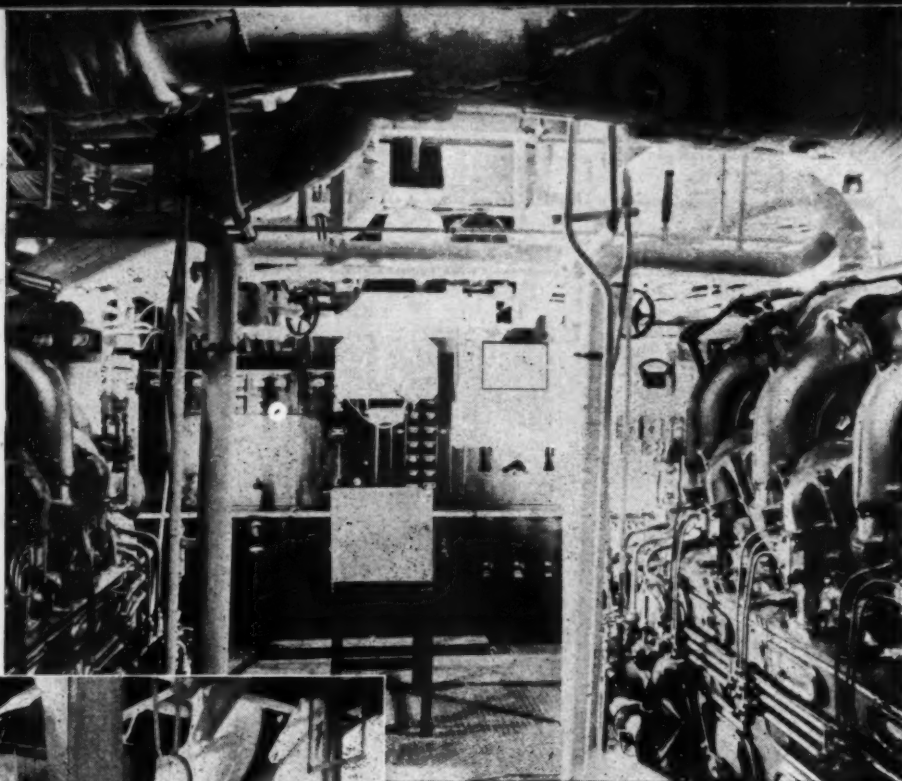
From the Noquochoke station the water flows to a 90 foot higher elevation at South Watuppa through four and one-half miles of 42 inch reinforced concrete main under the middle of the highway between Fall River and New Bedford.

Starting air for the Diesels is furnished by a pair of Fairbanks-Morse 10.2 cfm. air compressors; one driven by a three horsepower, F-M electric motor and the other, a standby unit, by a three horsepower F-M gasoline engine. Pressure in the three 30 by 60 in. vertical starting air tanks is maintained by automatic controls. Two Fairbanks-Morse jacket water circulating pumps re-circulate soft water through the Diesels and heat exchangers, obtaining an

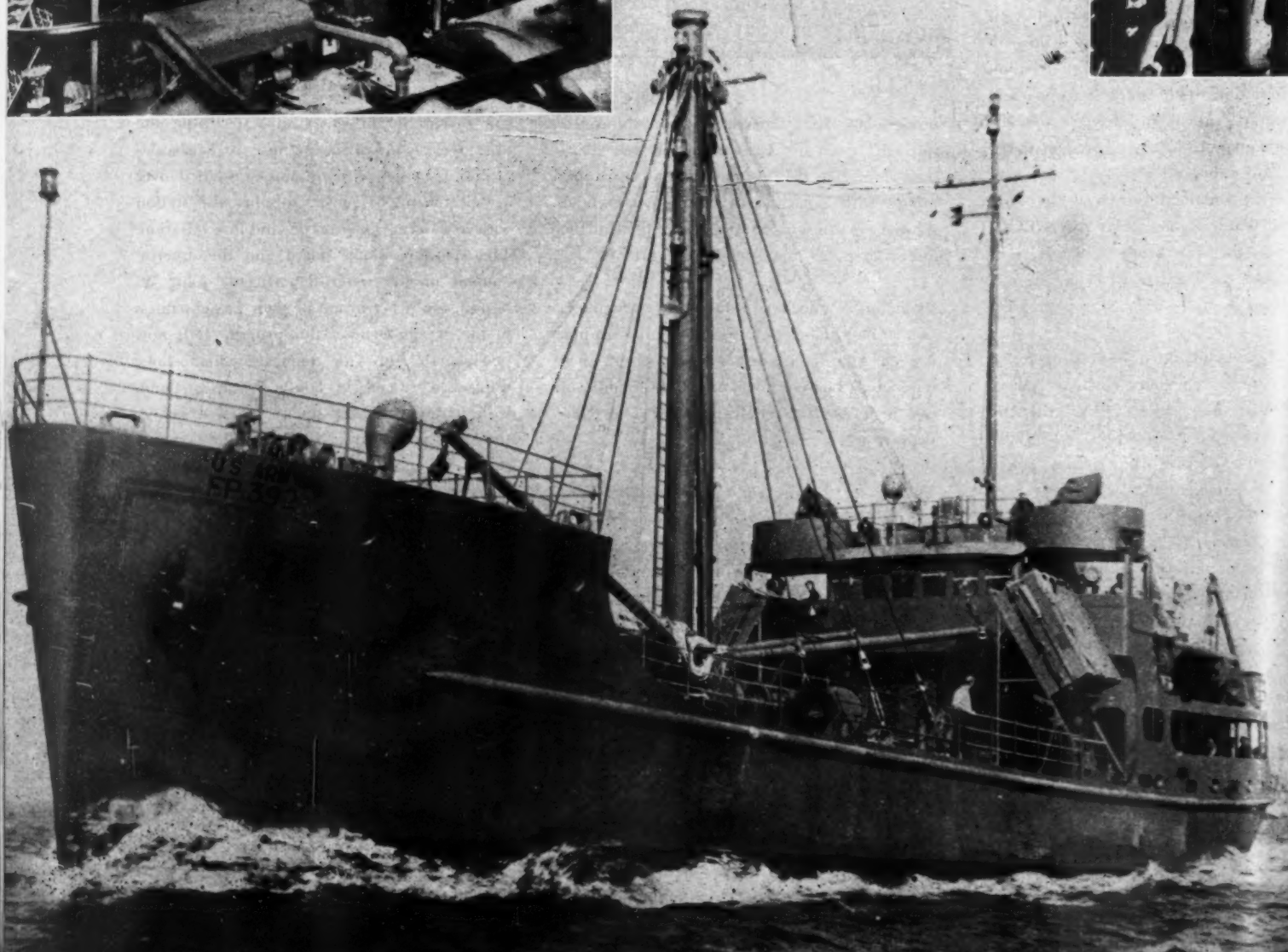
ample quantity of raw cold water from the discharge of the main pumps. A Fairbanks-Morse deep well ejector pump, installed over a well in the basement, supplies the station with fresh water for drinking and for sanitation. The Watuppa water board and the superintendent of the water department, John W. Moran, are justly proud of their farsightedness in the development of this project. It is now possible to store the immense Noquochoke water-shed run-off in South Watuppa Pond, with its area of 2,423 square miles, whenever this pond is at a lower level than the domestic supply basin at North Watuppa. Millions of gallons of water which previously ran, unchecked and unused, over the Noquochoke dam to the sea can now be stored and harnessed to the demands of industries and homes.

The Watupper water board has reason to be proud, too, of its financial condition which ranks favorably with that of any city in New England. The engineering firm of Hayden, Harding and Buchanan was in charge.

Right: View looking forward between the two General Motors main Diesels. Below: Aft end view of the main engines showing Marquette governors, right center and Fawick Airflex coupling and Falk reduction gear, lower right.

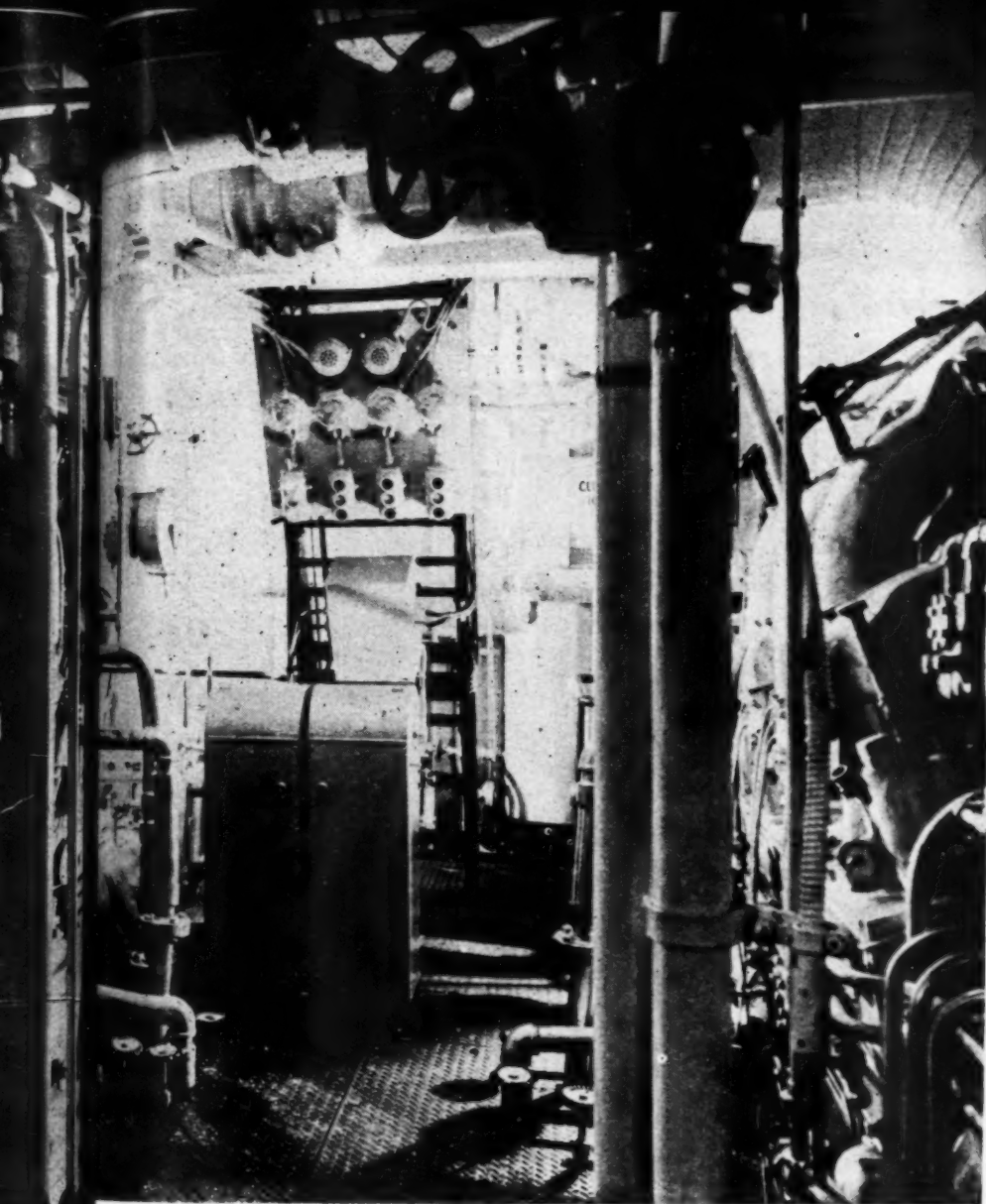


Below: The 175-ft. U. S. Army Diesel ship FP 392 on trial run. She is a combination freight and passenger type for the Transportation Corps.



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View looking aft between the General Motors propulsion Diesels. Viking safety alarm controls are seen upper center.

DESERT-BORN DIESEL SHIPS

By JIM MEDFORD

AMAZING, isn't it, the building of a seagoing steel ship in the foothill desert country 15 miles back of Southern California's waterfront? But that is what a concrete pipe company is doing at approximately 23-day intervals. The huge hull sections are Diesel-trucked to the Long Beach (California) harbor, assembled, then loaded as a complete ship on a 1,500-ton capacity launching marine cradle and launched, ready to sail except for final fitting.

On a thousand-mile waterfront where ships of every type and tonnage, at some point, hit the ocean hourly, the United Concrete Pipe Company, peacetime builders of tunnels, dams,

bridges and pipe, is making ship history building a fleet of 175-foot combination freight-passenger vessels of the inter-island type for the Army Transportation Corps.

Like something out of Ripley's hat, the ship sections, weighing up to 40 tons, roll out of the desert fabricating yard and arrive at the channel-side assembly landing on giant semi-trailers behind Diesel trucks to be stitched together with male-welded welding torches. Because, you see, Concrete Pipe employs no "ladies" in either yard; man rules this non-feminine spot, the only one of such on the West Coast.

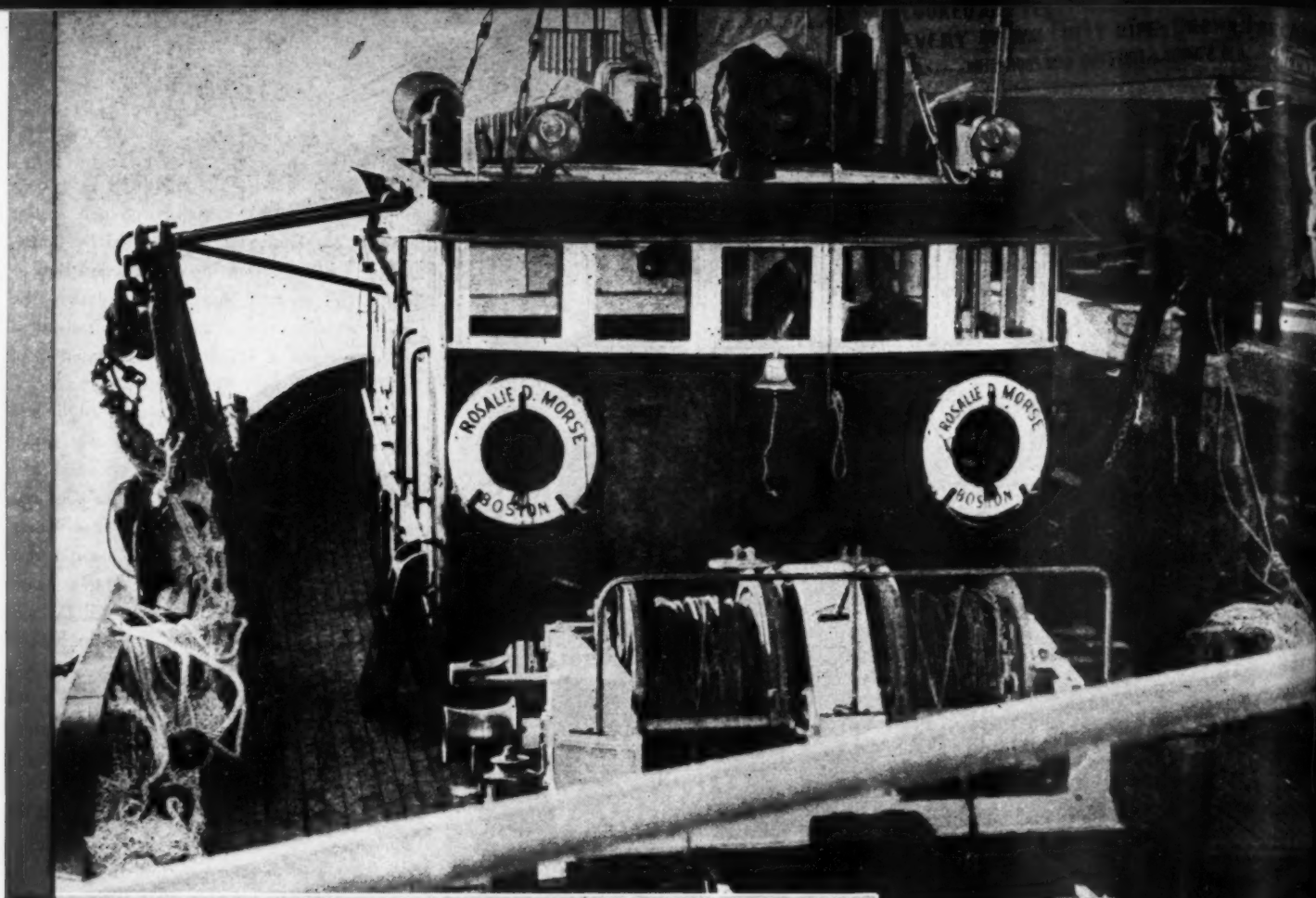
Six building slabs in the elongated yard keep more than 1,000 men engaged. When a ship is ready for launching it is shifted by house-moving methods from the construction slab to the marine railway cradle which lowers the vessel into the water. This marine railway is an innovation of Milton Shedd, United Concrete Pipe engineer. With a 1500-ton capacity, it handles ships up to 225 feet in length and beam of 40 feet. Extending 488 feet under water and 1400 feet on land, the railway also handles vessels from water to land for overhaul, and is one of the largest on the West Coast. These work vessels are of sturdy construction with all machinery aft, have a 32-foot beam, a depth of 14 feet, and are propelled by twin 500 hp., six cylinder, V-type General Motors Diesels turning 750 rpm. through Fawick Airflex clutches and Falk 3-to-1 reduction gears for speed of 13 knots. Shafts are of 5 3/4 inch steel, propellers are 4-bladed and stern bearings are of bronze with vulcanized rubber jackets.

Energy for operation of auxiliary machinery, pumps, hoists and refrigeration, is supplied by two General Motors 3-cylinder, 150 hp. Diesels direct connected to 100 kw. d.c. generators turning 1,200 rpm. A third auxiliary Diesel is a Superior, 4-cylinder, 42 hp. unit, direct connected to a 25 kw. standby generator. All auxiliary Diesels are battery started.

Freight refrigeration is by Freon-12 with temperatures ranging from 10 degrees F. for meats to 45 degrees for drinking water at the cooler.

A 24-foot launch is carried on main deck. The engine is a 27 hp., 2-cylinder Kermath-converted Hercules Diesel. Crew accommodations are for twenty-six men.

The United Concrete Pipe Corp. personnel is headed by President B. J. Ukropina and includes Cecil Drake, naval architect and administration manager; Steve Kral, Tom Polich and E. E. Hall, vice presidents; F. O. Magellan, works manager; Harry Fox, purchasing agent; Paul Preston, chief engineer; Roy Chinnichi, supt. of hulls; and George Gammon, supt. Equipment items include: Marquette hydraulic governors; Gardner-Denver compressors; Allis-Chalmers and Westinghouse generators; Viking fuel oil transfer pump; fuel and lube oil filters by Commercial Filter Co.; lube oil cooler by Ross; U. S. gauges and thermometers; Exhaust pyrometer by Brown; cooling water pumps by Ingersoll-Rand; cooling system thermo valve by Fulton-Sylphon; water valves by Crane; lube oil pressure alarm by Viking Instrument Co.



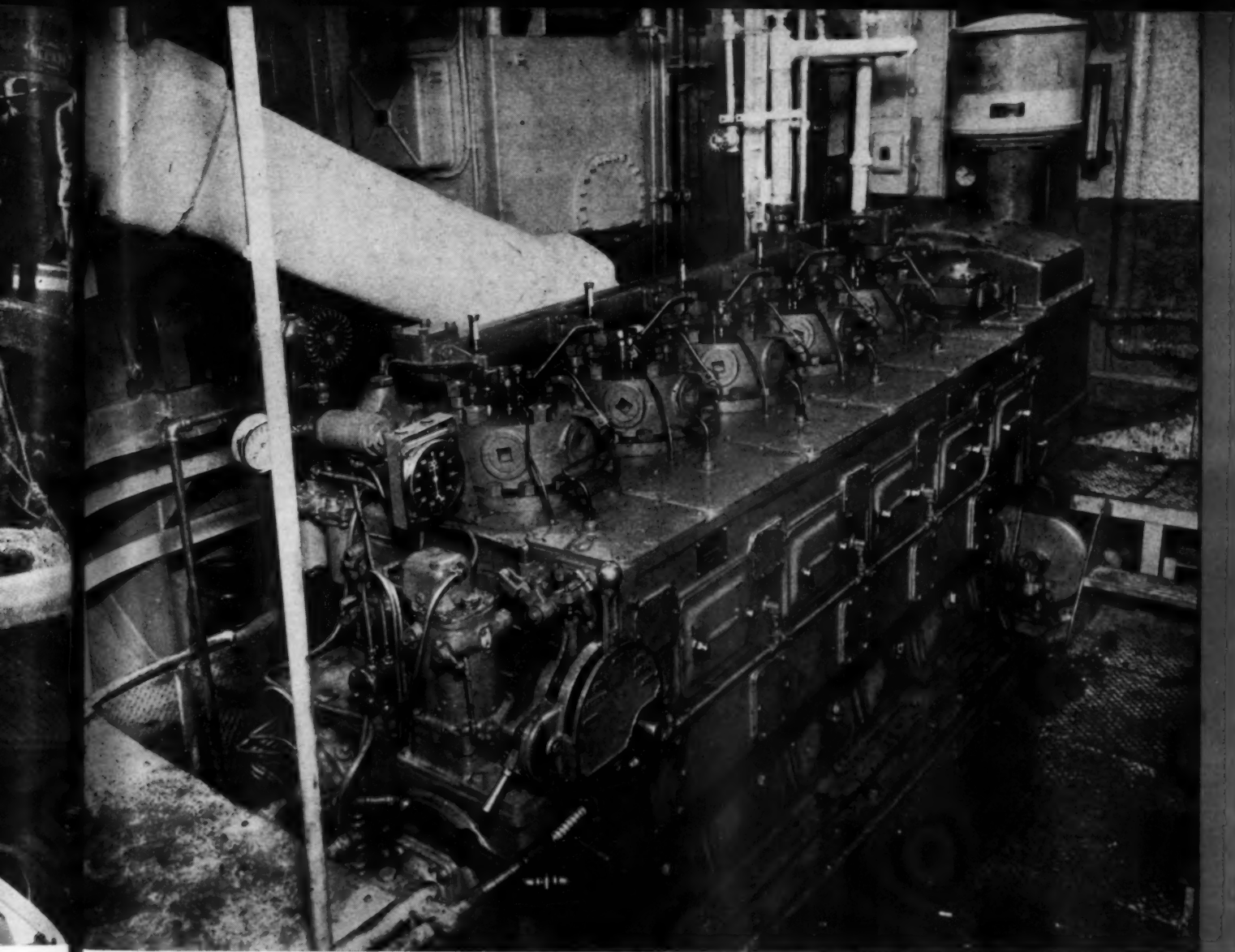
The "Rosalie D. Morse," with F-M officials and guests,, snapped as she started her maiden fishing run.

FLOATING LABORATORY

By WILL H. FULLERTON

Scene at T-Wharf, Boston, as guests were gathered last October 18, for a day of fishing.

FAIRBANKS-MORSE has built, powered and fitted out a new fishing boat, and is operating it in the regular fishing trade out of the Port of Boston. The purpose behind this venture into an occupation far removed from heavy-industry manufacturing is to have available at all times a floating laboratory in which to prove the worth of new developments in machinery design and construction. The present propulsion engine in the new boat is a new type of Fairbanks-Morse Diesel. Another new Fairbanks-Morse Diesel is already waiting to take its place when this one has shown its capabilities through an extended period of actual service. In a similar manner, new Fairbanks-Morse pumps, motors and auxiliary equipment will be tested under working conditions—tested at the expense of the manufacturer and under the constant watchfulness of men who are qualified to interpret the results as observed and to make recommendations which will lead to further improvement. Fairbanks-Morse is encroaching on the field of good customers, the fishermen, only to perform



First test engine on the "Floating Laboratory," "Rosalie D. Morse," a 5-cylinder F-M Diesel.

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The mutable Atlantic decided to be kind on the morning of October 18th, last—kind to the guests of assorted sea experience who assembled on Boston's T-wharf to board the *Rosalie D. Morse*. This was to be the formal trial run of a new trawler, built to go fishing under the charge of Fairbanks-Morse for the major purpose of bringing back with her cargoes of haddock and cod such valuable information as how new types of Fairbanks-Morse Diesels and pumps and motors would perform under hard service at sea.

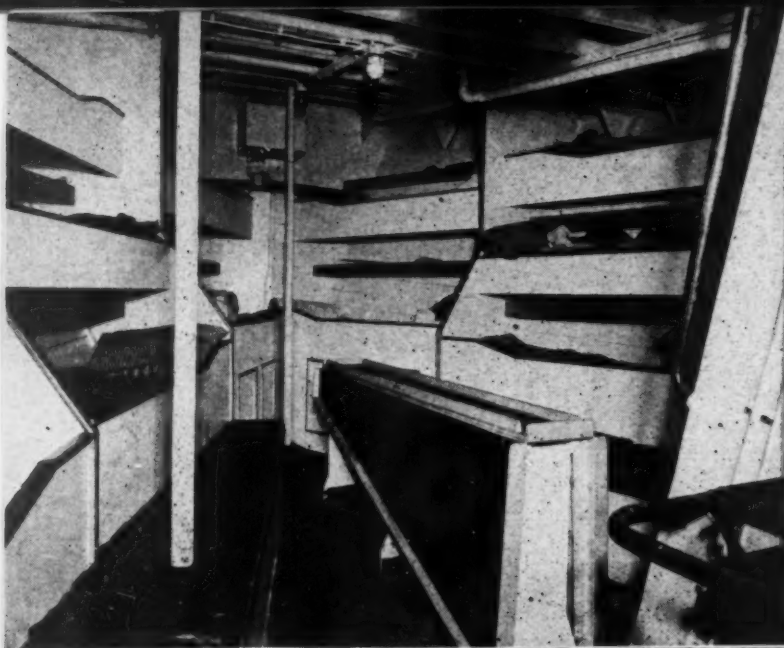
The guests were prepared to inspect the layout and appointments of a fine boat, probably the most highly mechanized and de-luxe rigged in the trade, and they took for granted that they would witness a faultless performance of all her operating functions. Captain Bernie Wolfe had ideas, however, and a treat was in store. They were going fishing.

A round trip to the regular grounds could not be accomplished in one day, but Captain Wolfe knew that a freak run of fish came in close to Boston Bay at mid October of every year, and he thought he could find them. The trawler cast off her lines at 9:30, and after a short delay at the submarine net, headed out to sea. With that mysterious intuition that good fishermen have, Captain Wolfe decided at about two o'clock that here was the place.

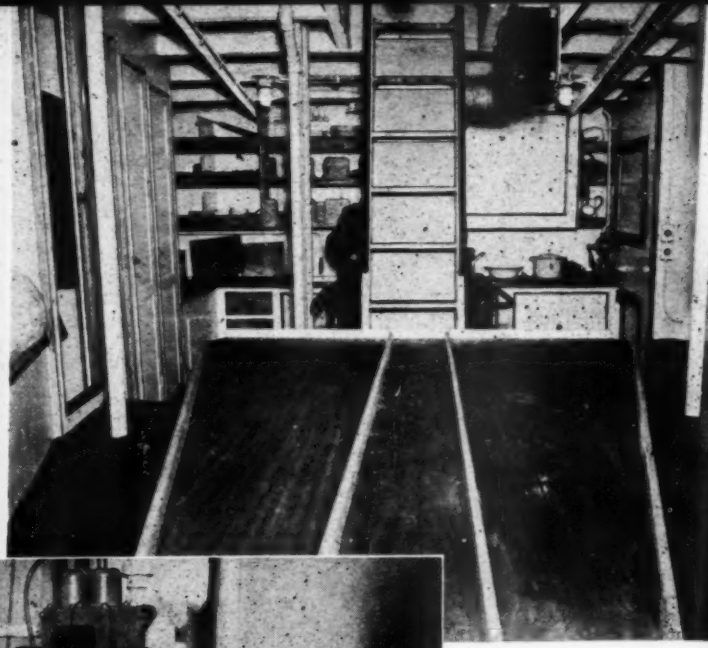
All hands set to, and the nets and trawl doors went overboard. Winches paid out cable, and nets trailed aft and sank beneath the wake kicked up by the Diesel belowdecks. The *Rosalie D. Morse* dragged for an hour at about four knots, and then came orders to haul. Winches churned and doors appeared first—to be followed by a net now bagged out with its cargo of treasure. Over the side it came, and at the pull of the drawstring, a cascade of squirming red-fish, haddock, flounder, hake and butter-fish slithered across the deck.

The select passenger list had already put a stamp of full approval on the performance of the new-type Diesel and the new boat. Here was an extra dividend, though, and all pronounced the trial run a thrilling experience and a tremendous success.

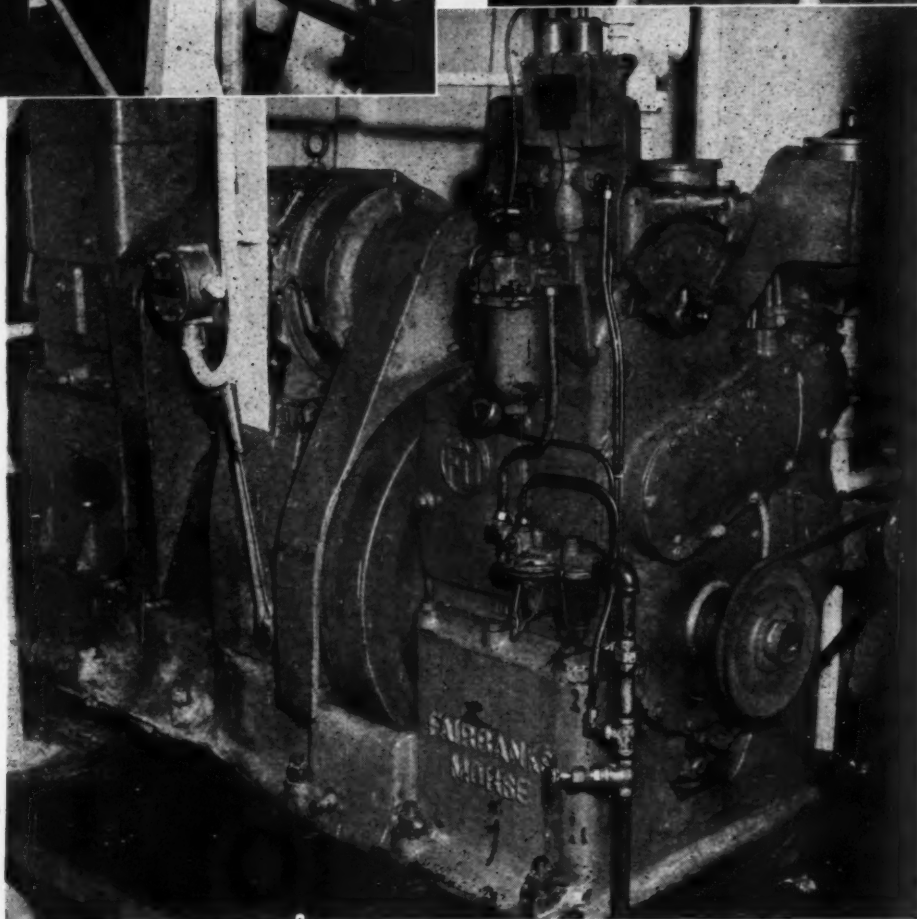
Approved by the American Bureau of Shipping, the *Rosalie D. Morse* is of all-steel-welded construction, 96 feet in length, 22.7 feet in breadth and—less cargo—about 11 feet in draft. There is a collision bulkhead just forward of the compartment which houses galley and mess accommodations and bunks and individual lockers for a crew of twelve. A solid bulkhead separates crew quarters from a fish hold of about 215,000-pound capacity, and other bulkheads stand between fish hold, engine room and after lazarette. Tank capacity provides for 6500 gallons of fuel and 1400 gallons of water. The *Rosalie D. Morse* will take to sea about thirty-five tons of ice to keep her catch in good condition.



Crew's bunks and mess table are cleverly sandwiched in the forecabin.



The compact but complete galley is under the forecabin ladder.



The auxiliary unit, comprised of air compressor and generator, is powered with a single-cylinder F-M Diesel.

The deck house includes officers' quarters for four, toilet accommodations, chart room, inside access to the engine room companionway, and a pilot house equipped with manual steering, direct and telegraph engine controls, binnacle, searchlight, fathometer, direction finder, and a control panel for all running and working lights. After the war will come a ship-to-shore radio telephone.

Forward of the deck house is the Hathaway double towing winch, driven through a vertical shaft by a bevel gear on the forward extension of the shaft of the main engine. Other deck gear is conventional, but well chosen and of

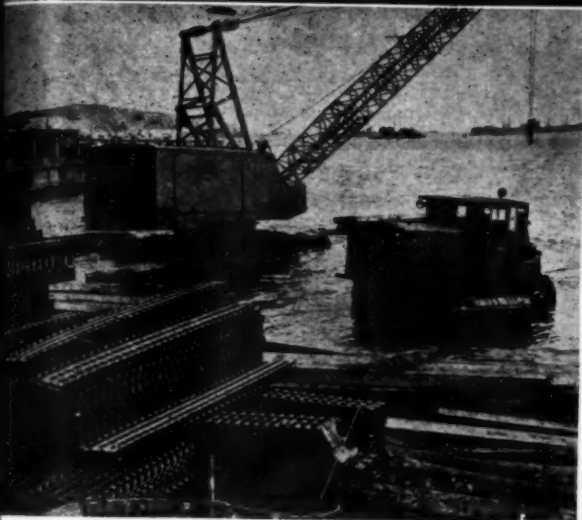
the highest quality, and forward there is unusually ample storage space provided by the design of the forecabin head.

The propulsion engine at present under test in the *Rosalie D. Morse* is equipped with every practicable safety control and indicating device so that all aspects of engine performance can be kept under constant scrutiny. A single cylinder Fairbanks-Morse Diesel auxiliary drives an air compressor and a generator, and another generator is driven off the tailshaft of the main engine. Against the after bulkhead of the engine room is a set of new type glass-jar storage batteries.

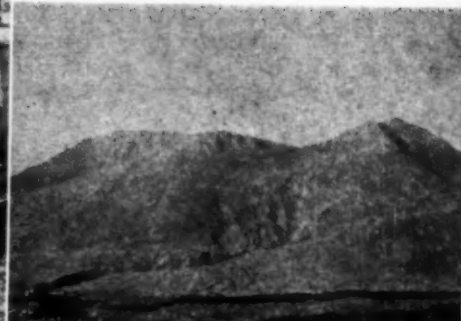
With her formal trial run out of the way, the *Rosalie D. Morse* next went out fishing in earnest. She was gone for about the usual time for this season of the year, and she came prom back with no less than 138,000 pounds of fish—a pretty good indication that everything functioned as it should. What happened next? Well, she was tied up at the dock for a while. Things that had performed excellently were taken down and other things were put on—to see if they would work as well—or better. That's the real idea behind Fairbanks-Morse owning and operating a floating laboratory and going into the fishing business. A sound idea, soundly launched and off to a good start.



Landing supplies at Massacre Bay, Attu, with Caterpillar Diesel tractors.



Left: Unloading steel mats for surfacing airfields. Note: the "Cat" is almost amphibious.



Airstrip construction with Caterpillar Diesel tractors, Le Tourneau Carryalls, and deep rooter plows.

DIESELS MAKE FIXED FLAT TOP OF ATTU

By JIM MEDFORD

IRREGULAR shapes in a turbulent and fog-bound sea, the Aleutian Islands might be discarded fragments by The Maker of the North American continent. The outer end of their finger toward Tokyo nudges the Asiatic land mass. A wart on the tip is Attu, originally a bird roost—an immobile "flat-top," now.

Though every American (Jap, too) is familiar with Attu's recent history, the part of the U. S. Army Engineer Corps in Attu's conversion to strategic usefulness can now be—well, hinted at.

The Army Engineers are the second wave that hits the invasion beach. Among the first machines to land are the Diesel "Cat" tractors with the Engineers at the controls; the 'dozer blades raised for protection against enemy fire, the Cats charge up the beach, dragging steel nets behind them, building roads to the higher ground, throwing up earthworks, and preparing the way for those that come after—the third wave.

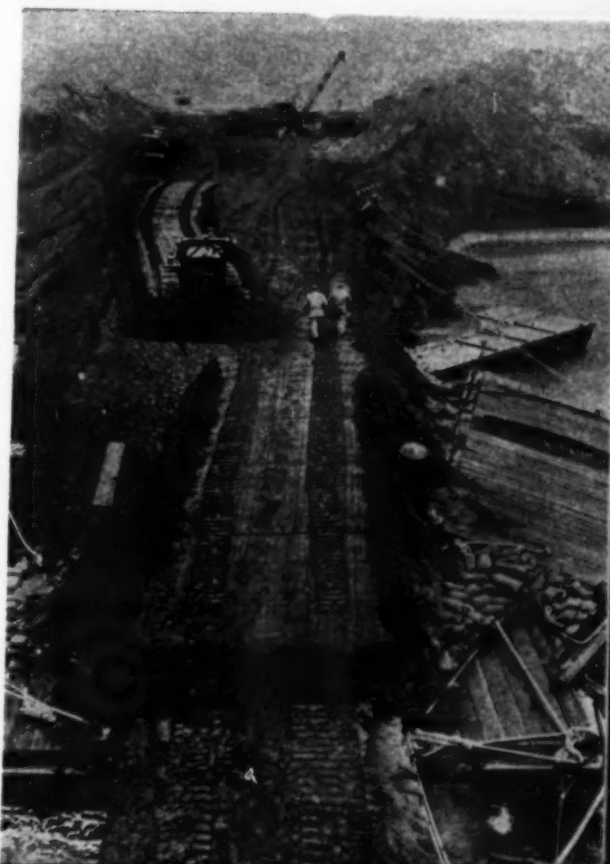
Airfields were needed on storm-lashed Attu.

The Engineers went in with a tank-landing barge loaded with Diesel dozers, fuel, and six weeks' time. The airfield site selected was an inlet full of ocean water. However, six weeks later, when the "Bring 'em on" signal went out to the Air Force, a steel matted surface was ready for the bombers, Nippon-bound.

Diesel bulldozers with Engineers riding them had literally pushed tens of thousands of tons of mountain side into that wet gulch, bringing it up to grade and crowding the ocean back into the Bering Sea. The Diesel dozer Cat is the airplane's brother in denim.

And, in their spare time, these Paul Bunyan power scoops haul out bogged tanks, give an assist to a surf-hindered truck, clear barbed wire, bring up rations and bombs, or dig a bath for the driver's daily "Saturday-night," after a meal cooked on the Diesel's hot manifold.

Then, the Cat chore-boy stands as a protective canopy over its sleeping "skinner."



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EL PROGRES

DECEMBER 1944



The author—advertising manager, Detroit Diesel Division, General Motors.

DIESELS GO TO WAR

By J. H. MOLONEY

Editor's Note: This is No. 2 of a series of articles on the post-war outlook for the Diesel Industry by men in the industry who know what they are talking about. In the November issue of DIESEL PROGRESS, Ralph L. Boyer, Chief Engineer of Cooper-Bessemer Corporation set forth his optimistic views on the future of Diesels on land, sea and in the air, prefaced by an interesting historical sketch. Following a similar pattern in a talk recently made before the S.A.E., which we reproduce in part herewith, Mr. Moloney gives us a few pages of the Diesel war saga and points to a bright future based on the proven accomplishments of Diesels in these trying times.

THE story of Diesel engines in the present war will probably be summed up in history as one of the outstanding achievements of American industry. To fully appreciate this story, however, let's go back to see where and how the Diesel principle originated.

Probably no one knows how many thousands

of years prehistoric man was cold before he learned to use fire, and finally, how to make fire. It is known, however, that natives on the island of Samoa in striving to find a means of making fire hit upon an idea. They carefully and snugly fitted a wooden plunger into a hollow section of bamboo which was closed at one end. A small piece of shredded, dried moss, was placed on one end of the plunger and just inserted within the hollow piece of bamboo. By then striking the other end of the plunger sharply, the air was compressed in the cylinder and if done quickly, the heat generated by compressing the air ignited the moss.

Though the origin of the Diesel principle is claimed by several, it has been said that Rudolph Diesel, a young engineer who had attended Munich Technical College in Germany, saw one of these bamboo lighters and hit upon an idea for a compression-ignition

engine. He built the first one in 1892. His original patent described such an engine for burning powdered coal which, when tried, promptly exploded and was wrecked. Diesel, himself, was injured but continued on to build another engine in 1897. This engine was successful, having employed fuel oil instead of coal dust, and immediately drew worldwide attention. A year later the first American Diesel was built.

Under license from the inventor, the engine was soon manufactured in a dozen countries. It was rapidly adapted by small European industries which had not been able to produce coal steam power as economically as the big plants. Its use spread to the United States slowly because coal has always been cheaper here. Diesel engines were the accepted power for our submarines in World War I. However, as late as 1933 the United States Navy, by reason of necessity, was still using in its submarines some Diesels that, while made in this country, had been manufactured under license of foreign patents.

The decade of 1930, however, saw a sudden reversal of European dominance in the use of Diesels. Speaking of power in terms of horse flesh, there is the draft horse, or early Diesel, at one extreme, and the race horse, or gasoline engine at the other. Not so many years ago the draft horse type was Diesel's only use. It was a huge, slow speed engine which sometimes weighed as much as 250 lbs. for every horsepower developed. Between the two there is a third category—a tough, wiry animal good at pulling intermediate loads under all sorts of conditions. He is the indispensable mule. He is the high speed multiple cylinder Diesel engine. He is the truck, the tractor, the excavating shovel, the highway bulldozer, and the passenger bus. There were a number of breeders of this mule in the Diesel industry. Among them were Charles F. Kettering and his associates, who applied themselves to the successful development of the two-cycle uniflow engine for commercial use—thereby capitalizing its advantage in reducing both weight and size.

As a result of this expansion and development on the part of the Diesel industry in this country, the United States quickly surpassed European countries in the practical application of Diesel units. The two installations of American engines which did the most to spur the industry on to increased proportions were:

First, the American submarine, in which the United States Navy expanded its use of the

1892. His engine for when tried. ed. Diesel, on to build he was suc- instead of worldwide American

the engine countries. European to produce as the big ited States en cheaper pted power . However, navy, by re- submarines his country, ense of for

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development in this com- surpassed E- application of s of Ameri- to spur the ns were:

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two-cycle principle. Its low weight and size permitted the carrying of more fuel oil, and greatly increased its potential range overnight. All of us are familiar with the records of our submarine fleet against Japanese shipping. Most of these operations have been conducted in faraway waters, thousands of miles from refueling bases.

The other dramatic event was the appearance of the world's first Diesel streamlined train. The railroad motive power application developed rapidly. Long before Hitler struck in 1939, each of at least half a dozen American railroads had more Diesel motive power at work on their main lines than the total horsepower of all Diesel motive power on German and French railroads combined. The proud streamlined Diesel passenger locomotive moves our vital civilian and military personnel faster. And finally the lord of all the rails, the 5400 horsepower freight locomotive, is writing the pattern of a vital postwar development in the tremendous war hauling jobs it is doing. The many important railroads that have them in service invariably assign them to the toughest spots. Many of you have read of the Diesel locomotives which our Armed Forces have transported to the Far East to solve the Russian supply problem. In regions where steam locomotives could not be used because of the terrific heat and shortage of water, Diesel did the trick.

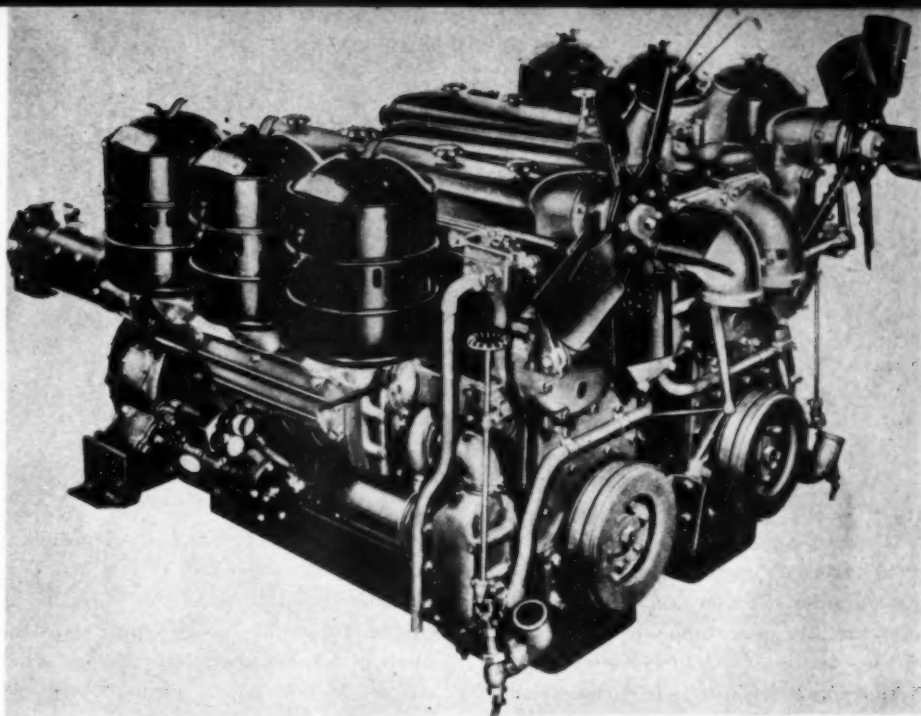
Development of smaller Diesels within the automotive horsepower ranges was accelerated. Before long Diesels were finding a full measure of work to do on farms, highways, and on scores of peacetime construction projects where developments and progress were quick to recognize the advantages of packing more power into less weight and space.

Stationary applications, made possible by this new economy in space and weight, multiplied enormously in mining, cotton ginning, lumbering, irrigation, and scores of other activities. As a result of this development, the United States, and the Diesel industry, stood ready in 1939 to cover the wide range of horsepower that might be needed in war.

Military tractors—better known in this war as bulldozers, powered by Diesels, have chopped standing fields and roadways from the face of the earth and cleared the rubble from devastated cities and villages.

Diesels were used in small landing craft such

Scenes showing widespread application of high-speed, light-weight Diesels.

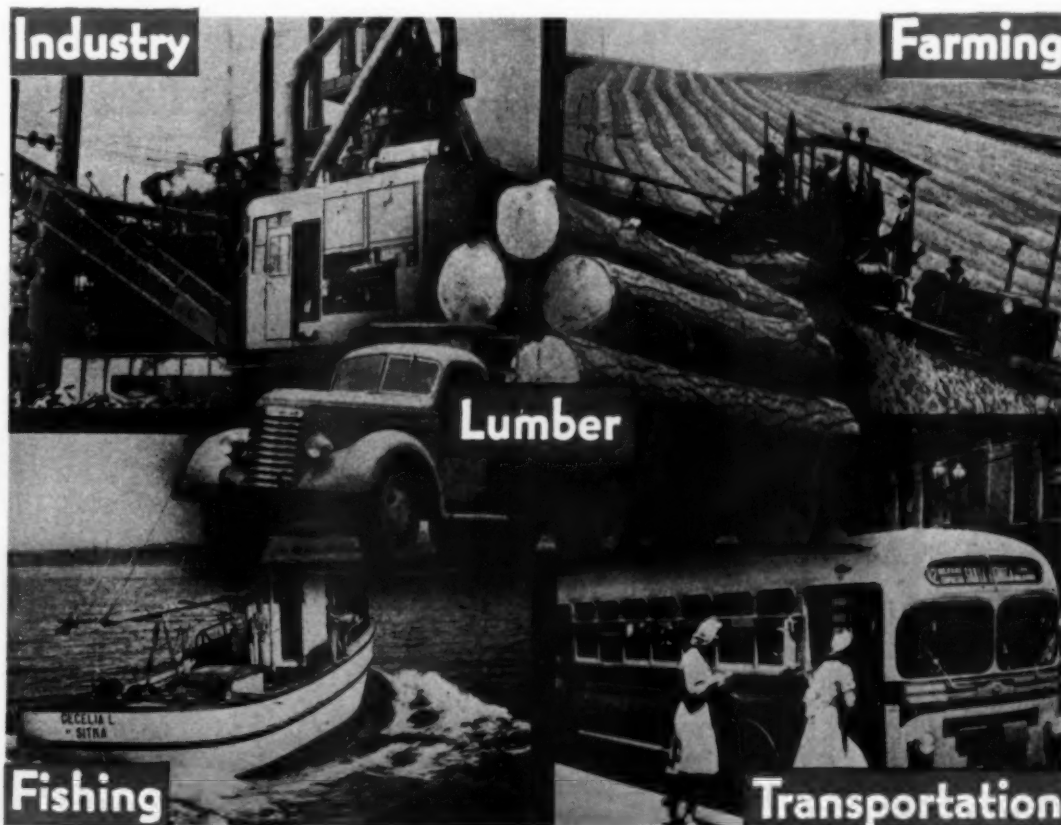


Typical hookup of a pair of 71-Series General Motors Diesels.

as the LCVP (Landing Craft Vehicle Personnel) powered by one six-cylinder engine and in the LCM (Landing Craft, Mechanized) powered by two six-cylinder units, and the LCT (Landing Craft, Tank) by three units. Each unit had its own propeller shaft. One or more units could be operated as desired. One of the unique features of this new type of craft is its ability to extricate itself from the beach by the creation of a miniature erosion with its wash and the use of a winch on the stern end. Engines used to propel these boats had a pre-war rating of about 165 horsepower each, and have been supplied to the Armed Forces at ratings up to 225 horsepower. The same engine has developed over 300 horsepower in laboratory tests. But Diesel engines were destined to play a major role in many applications of war.

Some applications required a maximum of power in a minimum of weight and space—standardization of parts for the many and miscellaneous types of application was essential. Engineering design had provided the answer—basic engines from two to six cylinders. Most parts of these engines were identical—engine for engine and cylinder for cylinder. Rotating parts, such as pistons, connecting rods, valves, etc., were interchangeable—and last but not least, was a symmetrical block, permitting right or left hand rotation with accessories on either side. It was this feature which permitted the coupling of two basic engines together by means of a transfer case to deliver the double power to a single driveshaft for the "Twin" Series 71 engine.

. . . . And now please turn to page 88



FARM-PROVED DIESELS WIN WAR

By F. HAL HIGGINS

WAR is approaching its end and may be over as far as the European front is over before this sees print. The outstanding job of the farmer has been given little attention because there has been plenty of food for everybody. The bulging warehouses, refrigeration plants and bins still on hand after shipping all that could be used by Army, Navy, Marines and allies plus whatever was needed in liberated areas attests the unbounded success of the American farmer and his machines. This in spite of less manpower and new machinery to do the job than ever encountered by his father and grandfather in producing food in past wars.

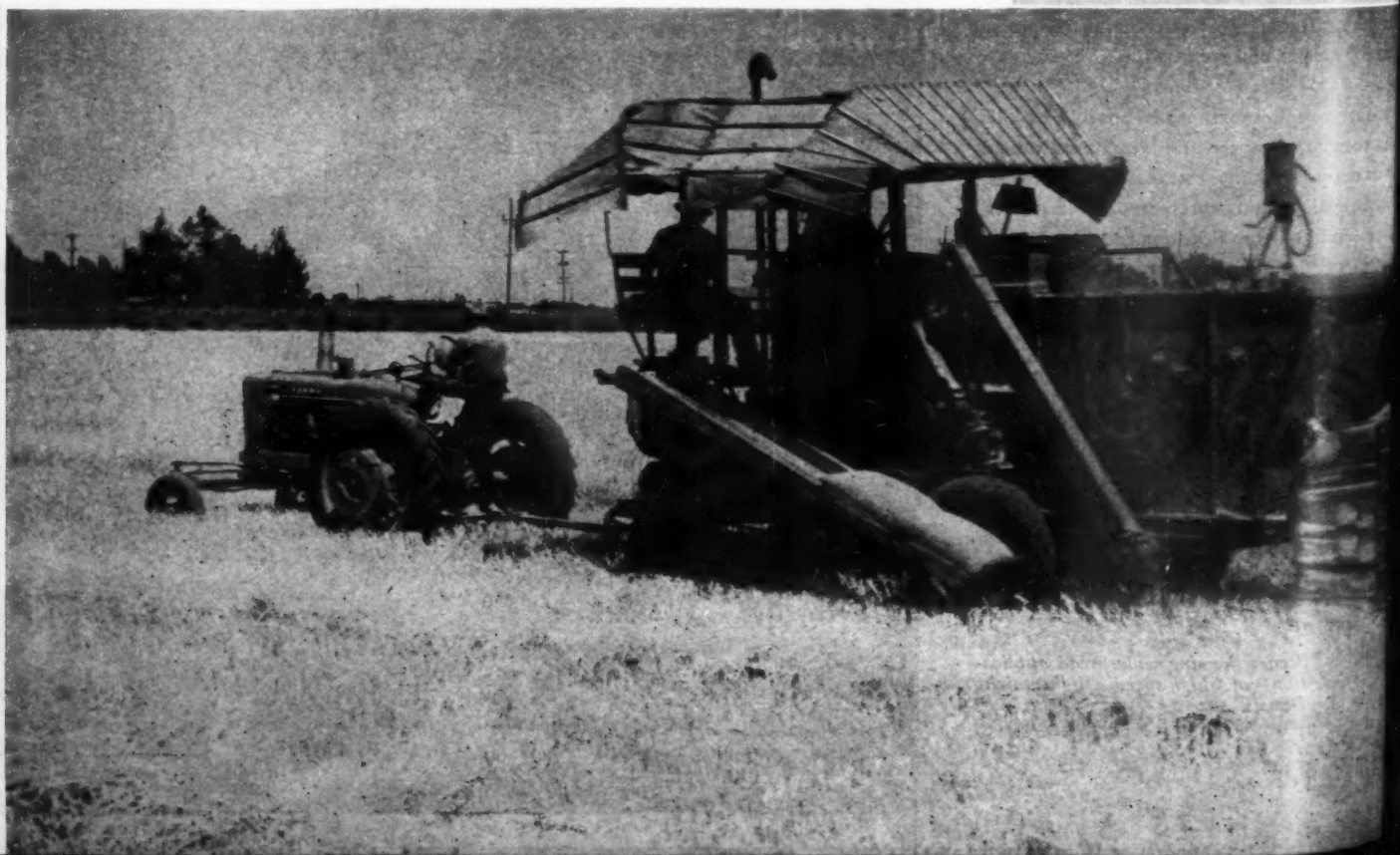
California happens to be the No. 1 Diesel tractor state. Your Old Reporter has driven many thousands of miles up and down its length to see the farmers using their Diesels the past four years since war broke in Europe to begin lifting farm prices off the depression bottom that was threatening to engulf the nation's agriculture. For there had been no real farm recovery in all this pre-war stretch from the bottom in 1932 to the war declaration late in 1939. That is, there

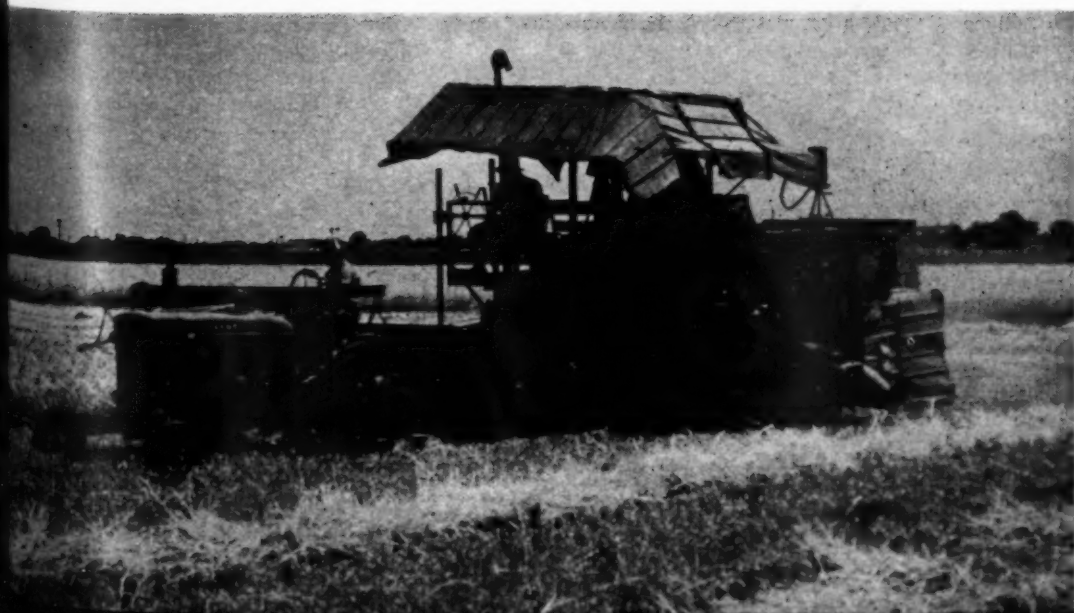
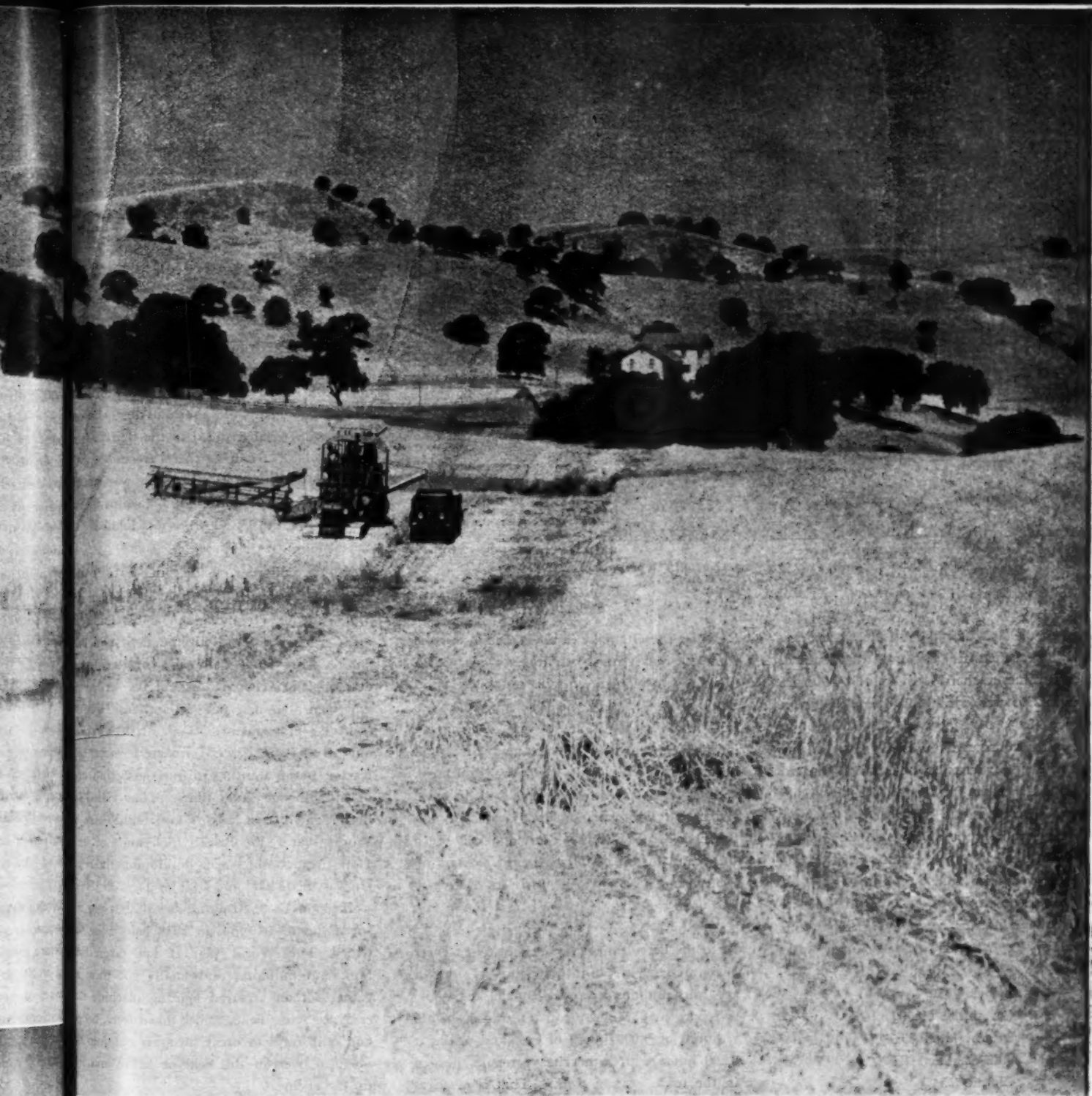
was "recovery" on the farm only where Government payments poured in to help pay taxes and interest and in those spots where the aggressive farmer with enough capital and credit standing took the matter into his own hands and cut his way out by buying better tools that would cut his costs—Diesel tractors.

Prof. H. B. Walker, head of the Agricultural Engineering Division, University of California, has recently completed a survey of the California farm tractor scene. This survey shows California has approximately 25,000 track-layer tractors. These are used 1,230 hours per year, on an average, compared to 960 hours for wheel tractors. There are many crawler tractors in southern California which run from 4,000 to 6,000 hours, of course, in the highly specialized vegetable areas in the Imperial valley.

But to get to the Diesel side of the crawler picture, Walker's survey shows 42.3% were burning Diesel fuel, compared to 50.3 burning gasoline and 1.9% stove oil. These latter may have been Diesels, though no place for Butane

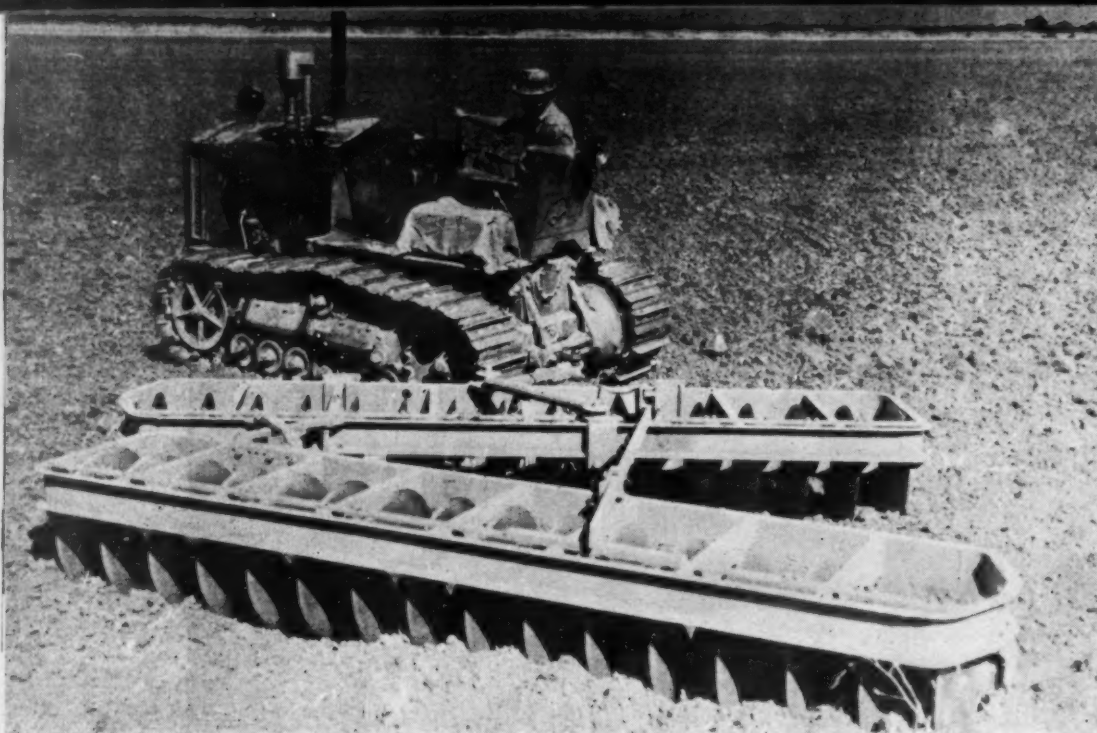
International Harvester Diesel tractor pulling a combine in barley harvest near Modesto, California.





Harvesting with an Allis-Chalmers, General Motors Series 71 Diesel engine crawler tractor. The owner says Diesels cut costs and permit farming much marginal land at profits.

The tractor looks small (a wheel job too) for this big combine but under the grease the name reads, "International Diesel" which means plenty of power.



Here is a Cletrac crawler tractor powered with a Hercules Diesel at work near Pleasant Grove, California.

seems to be left for the crawler machines. Nearly 3% of the wheel tractors burned butane. When it comes to the work done on California farms in this war crisis of machine and man shortage, 60% of the total tractor drawbar horsepower hours used on farms in California are furnished by crawlers. Yet the estimated census of California farm tractors in this study shows 37% crawler and 63% wheel. Up until war broke and stopped Diesels coming to the farm, at least one manufacturer had swung entirely to Diesel and was selling 100% of his product to farms as Diesel-engined. The makes on California farms as listed by this University-War Production Board survey were:

Tracklayers—

- Caterpillar 59.5%
- International 25.5%
- Allis-Chalmers 8.5%
- Cletrac 6.5%

The first two manufacturers use their own Diesel engines in their tractors. With Allis-Chalmers there is a mixture of older Hesselman type and the newer General Motors Diesels powering their product that has been gaining so rapidly in recent years. Cletrac has had the

Hercules Diesel engine in all its Diesel tractors from the outset nearly eight years ago. With their recent merger, or sale, to Oliver Farm Equipment Co., their field is expected to be fully exploited on farm as well as in heavy industry, logging and dirt moving. Oliver had begun to "go Diesel" just before war's outbreak with a few Buda-Lanova engines in their wheel tractors in California orchards and asparagus fields. It is possible that war's end may see a full scale step-up of Oliver-Cletrac tractors on wheels and tracks with Diesels in every size and type.

As to the herculean service that has kept every Diesel tractor in California going in spite of age, work and obsolescence of model, the Walker report says, "Major repairs on tracklayers are required at 5,000 hours of use, and again at 8,500 hours with rather heavy repairs needed in the tenth year of work." That is given as the mark at which a crawler is near its end of usefulness. The average age of tracklayers in California is given at close to 8 years. That means, of course, there are lots of over-age tractors still going strong and ready to be junked for new models the minute they can be made available.

Normal replacements of California farm crawlers would be 2,500 a year, the report says. Since Jan., 1942, over 2½ years ago, the replacement has been only a small fraction of the requirement.

What your Old Reporter would like to point out here, because few seem to realize the great service rendered country and humanity in the past 40 years of development, service, sale and operation of crawler tractors in California, is that this long, up-hill, mud-and-dust chain of trouble and grief that led to the perfect farm logging and dirt moving Diesel tractor of today is exactly what made possible the war strategy revolution that permitted the break-out in Normandy after the U. S. Army was landed.

It was the bulldozer on the tank that suddenly upset all pre-conceived notions of warfare and broke up the war and swept across France to the German border. Both the tank and bulldozer spring from California crawler tractor development. Over at Stockton the writer can find men who first put the bulldozer on the front of a Holt tractor back about 1910 to clean mud off the streets. LeTourneau, a young contractor, began wanting to butt walls and trees down with the same thing. That called for bigger and better tractors and bulldozers. By World War I, the British took some of these Holt tractors and began developing their first clumsy turtle-like tanks. The boys at Holt worked on U. S. Army tanks till they got ten speeds up to 18 mph. in 1918 before the war ended. This World War II has taken both tank and bulldozer and finally got them together for an armored fighting machine that can race across fields, knock down trees, hedges and tank traps to break an army out into the open to overrun the field of battle and roll up the enemy.

So, pause and give the farm Diesel tractor a hand. Look at these Diesels on wheels and tracks that are rolling along through grain fields and getting ground ready for 1945 crops. Come war or peace, the Diesel farm tractor can meet any demand and win.



Tractor with front blade preparing ground in the Sacramento Valley for a barley crop.

DIESEL CRANKCASE EXPLOSIONS—

HOW TO PREVENT THEM

By F. E. FAAST

cylinder surfaces. However, the same researches have shown that the distortion extends down to the unrelieved portions of the surface and that at those points the high spots or humps may be several times higher than at points closer to the bosses. This may be hard to believe, but if, say, a one-inch wide element of piston skirt running the full length of the piston is considered to be balanced like a see-saw on the piston-boss as a fulcrum then it is easy to see that the further away from the boss a point is taken, the higher it will tend to rise from the rest of the piston surface. This was proved* by several thousand precision dimensions taken on piston peripheries. Figure 1 shows vividly the location and extent of these distortions, which incidentally, stem solely from the expanded condition of the boss caused by pressing in the wristpin. These "mounds" on the skirt do not amount to more than a few thousandths of an inch in Figure 1 for a 21 inch piston, but it must be pointed out here that this graph is for the cold condition. Further experiments showed that these mounds may increase in height two or three times at normal operating temperatures due to further heat-expansion of the boss.

Figure 3 shows the skirt deformations resulting from such expansion of the wristpin. Figure 2 shows how controlled wristpin temperatures were obtained by injecting water and steam

* "Investigation of Large Diesel Engine Wristpins, Pistons and Crankcase Explosions" by F. E. Faast, *TRANSACTIONS, American Society of Mechanical Engineers*, November 1943.

into the wristpin to study the effects of heat.

With these high spots on the skirt, one can easily see now that in this design of piston the dividing line between scoring of the liner and not scoring, is very slight, and piston seizure is not very far off. In fact the engine with fixed-end wristpins, that does not show some cylinder wall scoring at one time or another is a decided rarity. Rounding-up of the piston by pounding opposite humps with hammers, usual shop assembly procedure even in original factory assembly, is of little use, as only the light parts of the skirt well-removed from the heavy bosses can be thus rounded. Furthermore the high spots that usually cause the damage are located at an angle of about 45 degrees with the wristpin, and these points are not usually checked for out-of-roundness.

The above detailed outline of piston deformation is presented for three reasons. First, they are a factor in most explosions. Where all other circumstances entering into an explosion are present, if due to reaction between piston and cylinder, the disaster could still be averted if this link in the chain of events that precede detonation is not present. Second, it suggests the way to overcome undue cylinder scoring, uneven cylinder wear, and resultant blow-by, inefficient operation and frequent overhaul. Third, it points the way to the wristpin as the source of the deformations, and possible elimination or reduction of the likelihood to explode.

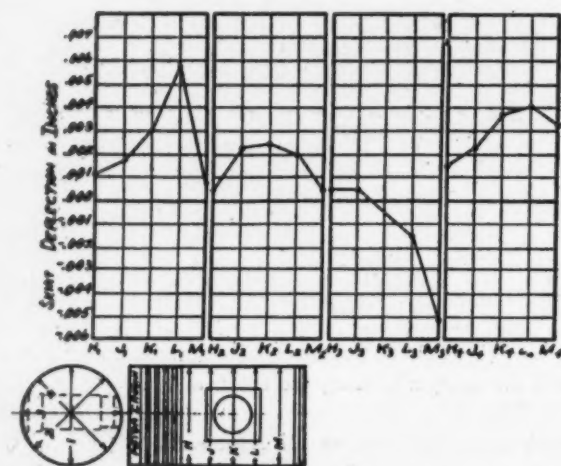
When slight scoring occurs from high spots located low down on the piston surface, the resulting hot sparks entering the crankcase will cause detonation if the crankcase gases are up close to their flash temperatures and contain air in explodable quantities. If the proportion of air is not within this range chances are some local combustion or unnoticed detonation will occur and be damped out by lack of air. If the oil vapors are not up near flash point temperatures, small hot sparks entering the crankcase will be snubbed out by the cooler crankcase atmosphere without damage or other change on account of their inability to maintain high temperature in the cooler surrounding vapor-air mixture, even though the latter may be present in explosive proportions. Although not

WRISTPINS have long been suspected as the source of most large Diesel engine crankcase explosions. The exact relation between the wristpin, the piston, and the events just prior to the detonation have been more or less obscure. We do know that whatever the underlying cause may be, certain conditions must exist before explosion is possible. The crankcase must be running hot with the temperatures therein sufficiently high to vaporize at least the more volatile ends of the lubricating oil which has previously been broken into small droplets in leaking and spraying out of the lubricated clearance spaces into hot and whirling surfaces, and there must be sufficient air present in the crankcase to support combustion. There must also be a source not necessarily large, of more intense heat higher in temperature than the lower flash point of the oil, to set off the explosion.

Great numbers of engines have two of these three conditions present and many of them at sometime or another are subject to the latter undesirable condition without serious effect other than cylinder scoring or piston seizure. If all three are present together, however, detonation or explosion is inevitable.

Avoiding overheating of wristpins in trunk-piston engines has been given much attention in recent years by Diesel manufacturers. Designers have tried flooding the wristpin bearing with large quantities of oil to carry away excessive heat. Where casualties have been over-frequent, engines have been provided with sealed-end wristpins filled with circulating oil, similar to oil-cooled pistons. The author is glad to say, however, that in the accelerated program of Diesel construction and research in the years preceding the war many of the problems have been overcome albeit the hard way, by trial and error, but usually by relatively simple expedients referred to later in this article.

Pressed-in non-floating wristpins have been the worst offenders. Experiments* and careful study have shown that pressed wristpins bulge out the piston periphery around the bosses. This is in itself not serious as the skirt reliefs or undercuts in this area can absorb such high spots without danger of their contacting the



DIAMETRAL DEFLECTION OF PISTON SKIRT CAUSED BY EXPANSION OF BOSSES
(Plotted for axial elements of piston wall. Average boss expansion = 0.0023 in.)

FIG. 1

exactly analogous, this is not much different from the manner in which a lighted match plunged into an open pail of gasoline will be snubbed out without a trace of smoke.

Then again, when scoring is heavier and seizure is imminent, hot tears of molten metal dropped into the crankcase may have more serious consequences, due to their relatively large size, heat content, and ability to continue to give up heat to the surrounding vapors for a longer period.

If a drop is large enough and hot enough when it enters the crankcase atmosphere to cause local heating of the gases above the flash point, a flame will result if sufficient air is present, and if the flame is itself large enough and hot enough to further heat surrounding gases to the flash point there may be one or two local detonations and then the explosion that may wreck the plant and leave no more reminder of the engine than a pile of assorted scrap metal. This was the case in a Danish motorship that suffered a disastrous explosion some years ago, except that this explosion was the result of an overheated camshaft bearing in the crankcase frame. In this type of casualty, it is apparent that the crankcase vapors need not be at very high temperatures. This is particularly true if the heat source instead of being one or two hot tears, is a spot higher up on the piston skirt where the hot tears cannot get away and heat of scoring gets an opportunity to accumulate to a high temperature on a section of skirt.

An interesting sidelight the writer would like to mention here is the case of a piston which seize-welded so fast and gas pressures in the other pistons were so high that the connecting rod of the seized piston continued its upward stroke past the frozen piston, tearing the head

completely off the skirt.

The writer would like to mention here that this paper outlines the salient points of an investigation* of a particular group of engines made after severe explosions had been experienced therein. The investigation was undertaken simultaneously with an exhaustive search of the world's literature, completed, fortunately before World War II made this impossible. Data or clues that could be made use of in improving or obviating these dangerous engine characteristics were sought. One or two published reports were found fixing the immediate cause of known explosions, such as the case of the Danish ship mentioned above, as were also other instances of blocked lubrication to wristpins. Nothing but hit or miss guesses, which will not be discussed here could be found on the exact connection between poor wristpin lubrication and explosion, so that most Diesel men have been under the impression that the overheated wristpins are the high heat source that sets off the explosions. The fact that the evidence available to the author in pressed or fixed end piston pin engines did not tend to bear out this theory, was the reason for the investigations and research referred to above. Actually, as hinted earlier in the article a relatively small temperature rise in the wristpin may cause high spots on the piston wall and frictional heat at such high spots of sufficiently high temperature to melt the piston ring long before the piston pin temperature is itself high enough to set off an explosion, and certainly long before the wristpin bearing is melted.

Although any possibility of formation of high spots on the working surfaces in the cylinder should be looked upon with suspicion, it is believed that hot spots on the liner surfaces caused by pocketed cooling water or excessive scaling are not as much to blame for casualties as was formerly supposed, especially if the liner roundness checks satisfactorily in the cold engine. Roundness of liner, incidentally should be carefully checked both before installation on general principles, and after installation for undue pinching by bottom water gasket. Checking before assembly is necessary, both for pistons and wristpins, because aging and self-relief of internal stresses are known to have caused considerable unexpected warping of these important parts after manufacture. This check-up should be standard procedure before using spare parts which have lain in stock for any period.

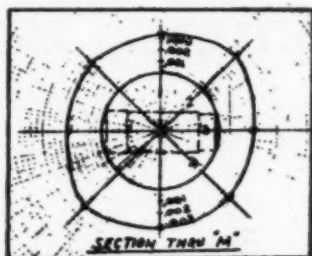
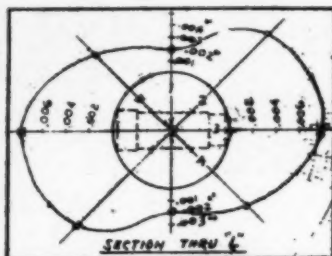
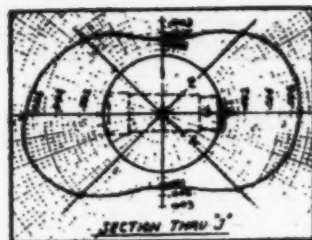
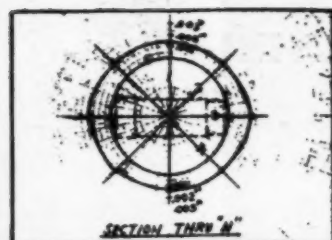
It is submitted that any appreciable slowing down of engines without change in fuel setting may indicate a hazard and should warrant im-



Fig. 2. Apparatus for heating slotted-end wristpins to study deflections in piston skirt.

mediate shutdown and investigation. For example in one of the engines investigated by the writer, a reduction from normal operating speed corresponding to 15 per cent reduction of power output without change of throttle setting would reduce the engine speed 52 revolutions per minute, and the output approximately 33 horsepower, or its equivalent of 15,000 Btu. per minute. If this heat loss is represented by friction at a high spot on the piston, caused by a temporary temperature rise in the wristpin due to, say, temporary partial failure of lubrication or rupture of oil film, the theoretical temperature rise of that section of skirt, after all possible losses, has been calculated at 3630 degrees Fahrenheit per minute above the initial temperature of about 300 degrees. This gives a total temperature of 3930 degrees Fahrenheit. In other words, since the melting point of piston iron is about 2200 degrees, the high spot would melt in about half a minute.

Many operating, maintenance men and designers to this day believe that wristpins should have a tight fit in the bosses of large truck piston engines in order to lend rigidity to the relatively thin skirt-walls. We admit that a hard press fit with a goodly amount of interference gives the designer a sense of safety and substantiality, and that the maintenance man may feel greater satisfaction from a tough job apparently well done. But this is one application where the lazy man's way is best. The lightest drive that will do the job and be considered reasonably safe against turning in the bosses during operation of the engine, is best. It will be seen below that very little interference is actually required. All of the foregoing theory is directly intended to bear this out. Automobile engine manufacturers years ago gave up all forms of tight-fitted piston-pins. They con-



DEFLECTION OF PISTON PLOTTED ON CIRCUMFERENCE FOR WRISTPIN DIFFERENTIAL-TEMPERATURE RISE OF 119 DEG. F

FIG. 3

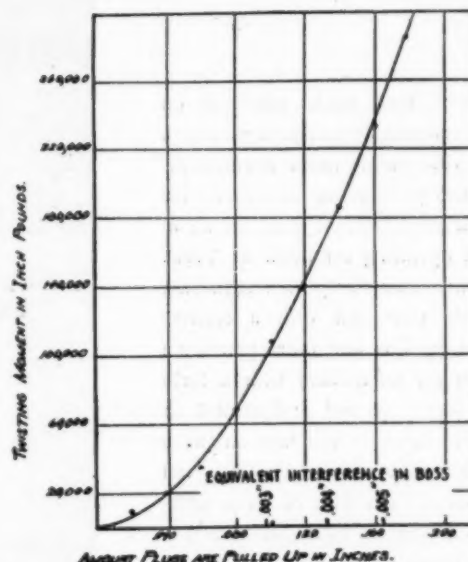


FIG. 4 TURNING MOMENT REQUIRED TO TWIST WRISTPIN IN BOSS

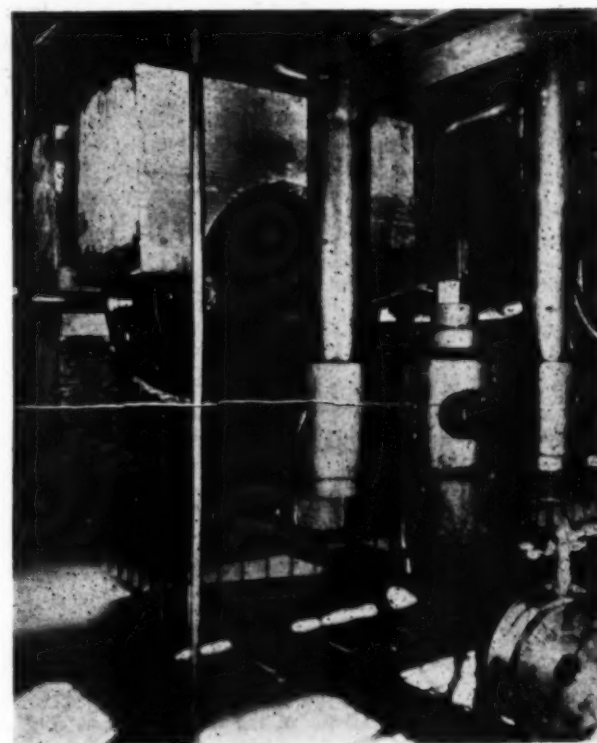


Fig. 5. Rig for measuring resistance of wristpin to turning in bosses.

conditions were necessary for detonation, namely, a hot-running crankcase, an air-oil vapor mixture in explosive proportions, and a high heat source to set off detonation.

Possible remedies are:

- (1) Use forced ventilation in crankcase to carry away oil vapor and keep air-vapor ratio above explosive point. This involves additional equipment and high lubricating oil loss unless oil vapor recovery equipment is added.
- (2) Cool the crankcase. This again is usually impractical on account of the additional equipment and is not altogether fool-proof, since high heat accumulations may counteract the otherwise cool oil vapor.
- (3) Take every possible precaution to keep wristpins from overheating, such as the following:
 - (a) Maintain a liberal oil supply to the wristpin.
 - (b) All oil coming into the lube oil system should be passed through filters, not strainers alone.
 - (c) No tank, crankcase, shaft, or other part of the oil system should ever be wiped with cotton waste or linty rags, as the oil stream has a tendency to carry lint and waste strands and accumulate them on rough surfaces in the oil passages until flow is obstructed. This and the next item have caused many a crankcase explosion.
 - (d) The system should be carefully checked for wiping cloths and other foreign materials left in tanks, etc., during repairs and cleaning.

- (e) Clean tarpaulins should be used to cover open parts of the system during overhaul to keep foreign materials from entering.
- (4) Keep piston pin interference fit in the piston as light as possible consistent with proper assembly.
- (5) Check for roundness and high spots of both pistons and liners at assembly.
- (6) Immediately shut down for investigation any engine that slows down without change of fuel setting.
- (7) If the opportunity presents itself and if the design of the piston and wristpin permit, by all means convert your pressed wristpins to full-floating type.

mainly had a sufficient backlog of experience from the millions of gasoline engines placed in service to warrant the change. It is gratifying to note that while the Diesel industry has been much slower than the gasoline engine builders to adopt floating wristpins, the old rigid and inflexible wristpin piston skirt assembly is fast becoming an oddity in new trunk piston Diesels. The writer does not claim that all Diesel pistons should have loosely fitted piston-pins where the skirts are not designed for them, but he does wish to expound that the skirt should be left with a reasonable degree of flexibility to allow it to conform to the shape of the liner and skirt under operating conditions without scoring or wiping off high spots, and that the boss interference should be small enough to keep the surrounding "bumps" on the skirt surface to a minimum.

To bring out the latter point more graphically, the particular Diesels previously referred to, when provided with wristpin fit interferences of only half a thousandth of an inch per inch of diameter, were tested in the rig shown in Fig. 5 for their holding power against turning from rubbing of the bearing. The holding power of the fit without keying, was found to be (Fig. 4) approximately nineteen times greater than the tendency to turn in the bosses. This safety factor can well be reduced to about four to five by using looser fits, without deleterious effect on the assembly.

To summarize, it was stated above that three

TRANSPORT tank trucks employed on long hauls and carrying thousands of gallons of motor fuel to vital points where essential defense and military projects are located and for industrial and domestic consumption, are maintained at peak operating condition by Truck Service Company, Santa Fe Springs, California which is closely connected with a refinery which produces gasoline and other petroleum products. Shops are maintained with a force of mechanics, highly trained and skillful in repairing and rebuilding if necessary, an entire unit from the radiator shutter to the tail lights of the trailer. The fleet of trucks operated by this company is equipped with 140 hp. Cummins Diesel engines, some of which have been driven thousands of road miles and are capable of delivering peak loads from the loading docks to destination, whether the dumps are located in mountainous country or in the wastes of the desert.

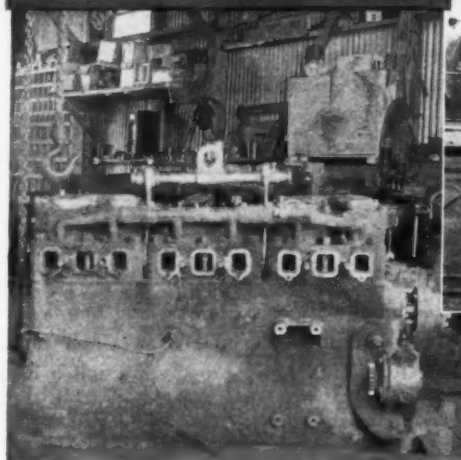
One important factor governing the successful operation of these transportation units is a rigid rule observed by the drivers, which requires that a truck, no matter where it is located or what its age is in relative miles, must not be put in motion with a load until the thermostat on the instrument panel shows that the engine jacket water has been raised to a temperature of 180°F. To prevent unnecessary waste of fuel, and to reduce the time of warming up, all trucks in this fleet are equipped with heavy wind-proof shutters made of cotton duck, placed in front of the radiator grilles.

The shutters operate on the principle of the ordinary spring actuated window shade, but have the spring roller anchored at the point of contact between the radiator shell supports and the frame of the truck. A heavy cord is attached to a substantial ring in the center of the shutter-top stiffening bar which passes through a smoothly drilled hole in the radiator shell above the core of the radiator and through small pulleys to a convenient place in the cab of the truck. The shutter is raised the necessary distance, by pulling the cord, to cover the entire front of the radiator, and remains in this position until the jacket water temperature reaches 180°F.

When one of these big units returns from a long haul, the driver has a list of inspection points which is given to the foreman, so the truck can be serviced quickly and placed in condition for another round trip without undue delay. At regular intervals of about 4,000 miles, the engine crankcase is drained, flushed and refilled with the grade and brand of oil

PROPERLY MAINTAINED DIESEL TRUCKS DELIVER CLOSE TO A MILLION MILES

By
JOHN C. ALBRIGHT



Above: Tank truck chassis with power plant entirely removed for overhaul and cleaning. Left: After 250,000 miles the Diesel is given a major overhaul.

found to provide maximum lubrication with the least tendency to sludging and the formation of engine varnish. The color of the oil is frequently inspected and when beginning to darken near the refill mileage, a new insert is placed in the filter shell. The entire chassis is lubricated each 1,000 miles with standard greases to keep the spring shackles and other bearing surfaces in first class working condition and to minimize wear.

A hand set lubricator, consisting of a drum made by using a short section of 4 inch pipe, is mounted cross-wise on the side members of the truck chassis for controlled oiling of the driving chains and sprockets. An oil feed connection is connected at each end of the lubrication drum on the lower side having copper tubing extending to the outer face of the driving sprocket. Each lubrication tube is fitted with a pinch cock or needle valve to control the quantity of oil flowing through the tubes to the face of the sprocket where the open end of the copper tubing lightly touches. Since the quantity of oil necessary to lubricate the

chains is relatively small, refilling of the drum is done at infrequent intervals. The quantity of oil in the reservoir is checked each time the chassis is greased to insure a sufficient quantity for the next trip. At this time, the storage battery, the cooling system, and the tires and chains are inspected thoroughly so that the unit can be operated over the maximum number of road miles with a minimum amount of expense and delay.

The system upon which this maintenance shop operates requires that, at intervals of approximately 80,000 miles—and when a new unit has been driven that distance—the truck is received in the shop to undergo what is called a minor overhaul. The Diesel receives consideration in this minor overhaul, and is partially dismantled by removing the valve rocker arm covers, the cylinder heads and the oil pan. The fuel pump is tested to indicate whether or not it is functioning properly, and all connections and injection nozzles put in condition by adjustment or replacement. The pistons are removed from the cylinders and



Heavy duty Diesel tractor units go through inspection before going out on their runs. Below: A reconditioned Cummins Diesel ready for installation in a truck. Note its new appearance.

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the old rings broken out of the grooves, which are cleaned thoroughly to remove all deposits of carbon behind the rings and on the face of the lands. The piston pins are taken out and discarded so the bushings can be reamed to the next oversize for new pins. Regardless of the probable tightness of the old pins in the bushings of the connecting rods and in the bearing bosses of the pistons, new pins are always inserted at the minor overhaul to prevent shock and possible damage to the pistons when operated with a set of new rings. If any structural defects are apparent from an inspection of the cleaned pistons, a new set is installed, employing a standard type which requires no "marcelle" expander behind them.

The connecting rod bearing insert shells are inspected for cracks and hair lines and "miked" for size, which indicates frequently that these parts can be used for the succeeding 80,000 miles of driving. The valves are refaced and the hard insert seats ground with the usual type of high speed tool, after which the engine enters the first stage of reassembling.

While the cylinder heads are separated from the engine, the rocker arms are inspected and if the rocker shafts and pin bushings indicate that clearance is beyond the accepted tolerance, new parts are installed. While the engine is being cleaned and reconditioned, the wheel bearings are taken out of all the hubs, cleaned and the cups and cones inspected, then refilled with grease and adjusted.

When this truck, for example, has covered the second distance of approximately 80,000 miles, the Diesel is subjected to the second minor overhaul. After being driven this distance, the drive chains and driving sprockets are changed for new parts to maintain the most effective transmission without excessive backlash. After the third distance of 80,000 miles, which has resulted in the truck having been driven from 240,000 to 250,000 miles, it is brought into the shop for what is called a "major" overhaul. Not always, but frequently the entire truck is disassembled in the shop and each individual wearing part gone over thoroughly and inspected for defects and amount of wear. The steering gear is torn down and reassembled with new parts when required, or shafts turned down in a lathe and under size bushings fitted. The principal consideration, however, is for the motor itself.

The engine at this mileage is removed from the chassis hangers and torn down completely. The crank and cam shafts are taken out of the block and the camshaft bearing sleeves driven out with a special puller. The block is placed in a vat of boiling Oakite to remove all baked-on grease, sludge and mineral deposits in the water courses, and after washing with steam and clear water, the block is returned to the shop for reassembling. Since the camshaft is usually found worn beyond the required tolerance, a new one is installed. The worn shaft, however, is not junked, but cleaned and covered with a rust resistant to be available when it becomes economical to rebuild the worn bearings. If the cams are worn beyond any hope of reconditioning, then the shaft is placed in the scrap collection to be sent to steel mills for melting.

The crankshaft is invariably found in condition for immediate reuse, since it is massive enough to resist misalignment in service. It is chucked in a lathe and the machinist turns the main and crank throws with a fine threading tool to form a rough sawtooth-like surface. These parts are then built up to a greater diameter than the original standard by several applications of sprayed metal which has approximately

the same characteristics as the crankshaft. The rebuilt surfaces are then turned down to standard size and finished by polishing. It has been discovered through experience that by building up the worn parts with sprayed metal of the proper alloy, the crankshaft will give service equal to a new one. The mechanic, however, who performs this part of the engine overhaul is always selected because of his wide experience with metals and training in the art of spraying metal on metal.

If the economics of the overhaul are such that the cylinder liners can be rebored to advantage, they are increased in diameter to the next oversize. New pistons, pins, bushings and rings are obtained and rings fitted to space and wall clearance for replacing those removed at the beginning of the overhaul. New bearing insert shells are used throughout and new camshaft bushings pressed in place, being extremely careful that oil slots and circulating holes match in the cylinder block.

The valves are checked for stem size, and if worn beyond certain obvious limits, they are replaced with new ones and new stem guides pressed in place. If successive grinding of the valve seats has deepened and widened the contact surface beyond that required for adequate valve head seating, the hard metal inserts are removed and new units expanded into the cylinder heads. All auxiliary equipment is reconditioned, the springs taken apart and buffed with a motor driven wire brush, the driving mechanism checked for wear and misalignment, and the differential is adjusted to the required clearance between the drive pinion and ring gear and supporting bearings locked to the proper adjustment between cups and cones.

While the chassis is stripped of essential working parts, it is steam cleaned and brushed to remove scale and the discolored finish so that it can be repainted while the motor and other major units are being reassembled. The entire process of reassembling the engine and other parts dismantled is followed in sequence to prevent overlapping of the duties and work of the different mechanics employed in the shop.

When ready for the road again, no part regardless of its size and relative importance has been slighted, which is responsible for some of these large trucking units having been driven more than 750,000 miles and still in mechanical condition for hauling peak pay loads. In fact there is no telling what the ultimate life of truck units may be if systematic maintenance is continued indefinitely.



First step: A cape chisel is used to remove and clean the metal around crack.



Next, bonding is accomplished by depositing pure metal using air-cooled electrode holder.

METHOD OF REPAIRING CRACKED ENGINE BLOCKS WITH ELECTRIC BONDER

REPAIRING cracked cylinder blocks by Electric Bonding is reflecting new savings in time and money for all shops who have installed this equipment. This process fills a vital need in maintenance and repair work today in view of the critical shortage of new parts and will prove equally valuable in postwar for effecting new savings in service departments installed with this equipment.

• President, Metallizing Company of America

The correct procedure for making block repair is exceedingly important. Care and judgment of the operator in following the directions step by step is the yardstick for success in this type of work. The only tools needed for the procedure are a $\frac{1}{8}$ in. to $\frac{3}{16}$ in. round nose cape chisel, narrow V-type pointed chisel, center punch ground to almost a round point (not too sharp an angle), hammer and hand grinder with small mounted wheels. Note the simplicity of tool equipment required.

With the $\frac{1}{8}$ in. round nose cape chisel a groove is cut from $\frac{1}{8}$ in. to $\frac{3}{16}$ in. deep and wide down the middle of the crack, allowing a square shoulder on each side of the crack (do not feather away). The groove should be cut at least $\frac{1}{4}$ in. beyond the end of the crack. Be sure not to chisel through the wall leaving a direct opening.

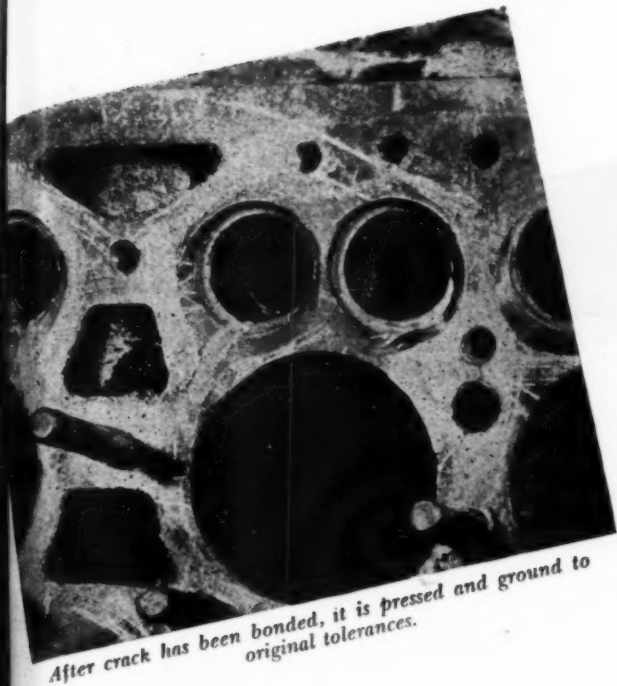
The groove has been made down the middle of the crack. In this step a very narrow V-point

chisel is used to clean the metal at

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After crack has been bonded, it is pressed and ground to original tolerances.

By L. E. KUNKLER *

chisel is used, thoroughly tapping to compress the metal at the crack.

The crack is now ready to be bonded. Set the Bonder terminal control at No. 4, 5 or 6. (No. 6 is the most efficient setting, but until the operator becomes familiar with the machine and the action of the metal it is best for him to start with No. 4 and work up to No. 6, which gives the highest heat). Use approximately 20 lbs. air pressure with the No. 4 terminal; No. 5 terminal 30 lbs. air pressure, and No. 6 terminal use 40 lbs. air pressure. The nickel rod should extend not less than 1 in. and not more than 1½ in. out from the holder. It will probably be necessary to hold the rod in contact with the surface for a few seconds until the rod gets red hot from ½ in. to ¾ in. back, and keep it like this while bonding. If the rod gets too hot lumps will come off and not form a fine dense deposit. Lay a layer of nickel in the bottom of the groove by agitating the electrode (similar to striking a match) across the surface. Move slowly to insure laying a good deposit.

With the center punch ground down to almost a round point, lightly peen the nickel thoroughly in the crack.

With the Bonder set at No. 4, 5 or 6, and air pressures as outlined in Step No. 3, a little

different procedure is used to fill up the crack. First, hold the electrode at an angle of 45°, proceed to pass electrode slowly over the cracked area (as outlined in Step No. 3) and allow material to fill up the cracked area as the rod is drawn towards you. This will require a little experience on the part of the operator to completely fill up the crack in one pass.

Set terminal control on No. 1 or No. 2 at 20 lbs. air pressure. Rub the electrode over the nickel deposit densing the nickel down to a more solid mass and filling in porous areas.

The excess metal must be finished flush. For best results valve seats should have inserts and cylinder walls should be sleeved. To finish the bonded deposit use a small hand grinder with small mounted wheels of various shapes, depending upon location and accessibility of the crack.

To eliminate any remaining traces of porosity in the deposited nickel, Mogul colloidal solution is recommended. This solution has suspended in the chemical, metal particles including chrome that if measurable would be .00050 in diameter. These metal particles can only be observed with a new electronic microscope. The metal does not settle in the bottom of the container. It is in constant solution and it enters areas inaccessible for water to pass through.

It coagulates and forms a new structure within a structure. The chemical components in the solution will clean the block, saving the necessity of degreasing.

If the motor has not been removed drain the radiator, and it is now a good idea to flush all foreign matter from the block. Then put in the radiator four gallons of water and one quart of Mogul colloidal solution. Run the motor for about a half hour until it heats up and complete circulation is made, allowing the colloidal in the solution to penetrate into any possible seepage areas. Then drain the solution and water from the radiator. It will be observed that the color of the solution will change from purple to oxide brown, which shows that cleaning has taken place. The solution has dissipated itself in the block indicating proper reaction, and the solution cannot be used again. The radiator is then filled to flush the block and remove all traces of the solution as it will not mix with anti-freeze. Finally the radiator is filled in the usual manner with anti-freeze and water. The motor is now ready for use.

In repairing cracks in aluminum cylinder heads follow the same procedure but substitute pure aluminum rod in place of nickel. The colloidal will in no wise affect the aluminum. It is usually desirable to use higher air pressure with aluminum.

THE SHIPSHAW PROJECT

One of the major engineering feats of history—the Shipshaw Hydroelectric Project—has been completed in the Canadian wilds under conditions of 30° to 50° below zero temperatures, inadequate road and railroad supply lines, and wartime difficulties in obtaining equipment for the job. Twelve giant turbogenerators now produce approximately 1,500,000 hp. to enable the Aluminum Co. of Canada to refine from bauxite the aluminum which is now dropping “eggs” on Hitler and Hirohito. The Saguenay River in the province of Quebec, Canada drops about the height of a 17 story building within a few miles, and was chosen for this power development which now produces 50% more power than Boulder Dam. The icy, rushing river had to be diverted from its course, the dam built, and the power plant constructed with the tail-race to send the torrent back to the original river bed. In all, the project required the removal of over 5 million cubic yards of dirt. A fleet of approximately 40 tractors was kept in active operation.

↓ Diverting the Saguenay River from its course with Caterpillar Diesel tractors and Athey trailers.



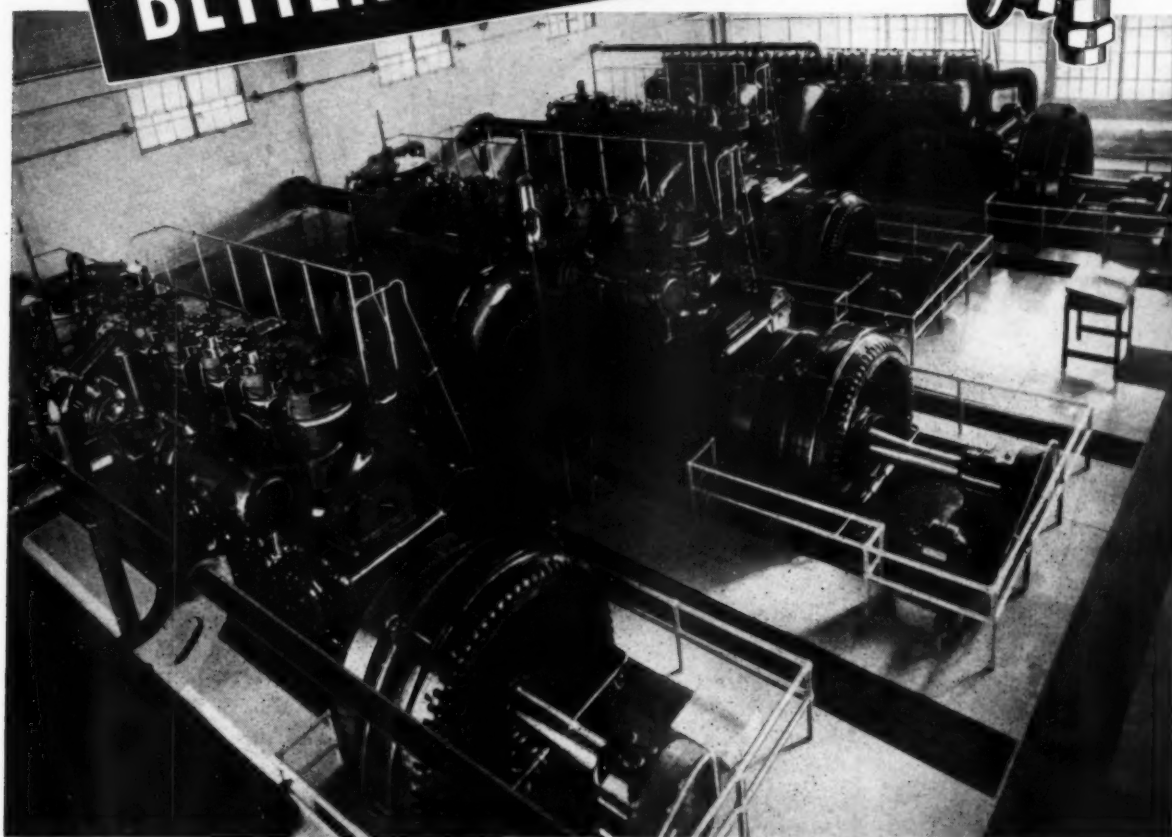
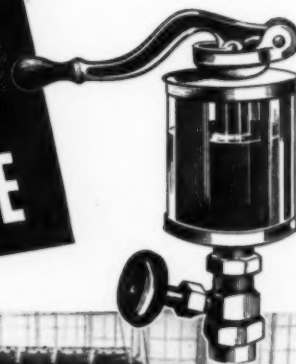
↑ Top view: A scene on the Shipshaw project where 5 million cu. yds. of material had to be moved in 30 months. Above: Caterpillar Diesels working under difficulties.



Right: Diesel “Cat” bringing concrete forms → into place.



BETTER LUBRICATION
means
BETTER MAINTENANCE



If you are experiencing difficult maintenance, better check lubrication. It may be inadequate with resultant excessive wear.

Sinclair offers better lubrication for better maintenance of DIESEL equipment. Sinclair RUBILENE and GASCON

OILS have high oiliness and non-oxidizing, non-sludging qualities. They reduce ring and liner wear... prevent scoring and ring-sticking.

(Write for "The Service Factor"—published periodically and devoted to the solution of lubricating problems.)

SINCLAIR INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

SUPERVISING & OPERATING ENGINEERS' SECTION

"SPECIALIZED LUBRICATION"

Part I

Conducted by R. L. GREGORY*

LUBRICANTS and their varied application to power plant equipment is a very interesting study, and quite a subject for discussion. With all the new applications and methods of lubrication equipment, it still remains somewhat of a mystery to many engineers and operators, as to just why so many grades, kinds, and quantities of lubricants are necessary. As one old time engineer, long since retired from active duty, once remarked to the writer, "I have never been able to figure out why you fellows are so particular and critical about your lubricants. Back in my days of active duty, we had but three lubricants in most plants, a heavy cylinder oil, a good red engine oil and what we called hard oil or cup grease. We used plenty of these but never experienced any difficulty. Now you fellows insist on just such a grade. test it often, filter it again and again, and to me it seems a lot of unnecessary work."

It will be the object of these articles on specialized lubrication, to go into the whys and wherefores of lubrication to a limited degree. This old timer was absolutely right in his statement concerning lubricants of several decades ago. But lubrication has had to keep up with the ever changing design of equipment, since the lubricants used are responsible for keeping our modern units operating and to a great extent are responsible for lower maintenance and longevity of that equipment.

The writer recalls an experience of some twenty odd years ago, which illustrates the point of specialized lubrication. This was about the time that the oil companies were developing personnel whom we now know as "Lubricating Engineers," whose duty it was and still is, to make special surveys of new types of equipment and recommend the proper lubricant for that equipment. The writer was on a job, installing a large multistage pump, for city water service. This pump was patterned after the modern horizontal multistage pump now so commonly in use, but in this particular instance the manufacturer had so arranged the design, that it could be used in a vertical position. It was placed about thirty-five feet below

the surface in a specially designed well, and had an extension shaft up to the pump house on the surface, with steady bearings along this shaft for alignment purposes. The pump was driven by a 750 hp. vertical motor, the shaft extending to the pump, hanging from a thrust bearing at the top of this motor. The operating speed of the motor being 3600 rpm., a much higher speed, than most units of that time were being operated. This thrust bearing was a specially designed bearing for the job and rested in a bath of oil which oil was supposed to be kept cool by means of a copper cooling coil, through which cold water was constantly circulated.

After the equipment was installed, alignment checked and the unit ready for operation, this oil tank was filled with a special oil, which had been recommended for this bearing and speed. After the unit had been in operation for a short period, the thermometer attached to the oil well showed that the oil was heating excessively, and if allowed to continue, trouble would develop with this thrust bearing. The unit was shut down and rechecked completely but no fault was found which might cause this undue heating. The manufacturer was consulted and his engineering staff made several recommendations, all of which were tried but to no avail, the bearing still heated up. Then an engineer from the oil company with complete knowledge of these special lubricating problems was sent on the job and for several days various oils, changes, etc., were tried out, but the thrust bearing still ran excessively hot and would only operate for a short period at normal temperature. Finally in a last desperate attempt, the bearing was dismantled, the oil withdrawn, the bath container thoroughly cleaned and the whole reassembled. He then put in a special fibrous grease, filling the container just enough to cover the bearing surfaces. The unit was again put in operation, and much to the surprise of all concerned with the job, including the "Lubricating Engineer" himself, the unit ran perfectly without any undue heating or trouble and when after three weeks operation it was shut down for inspection of the thrust bearing, it was found to be in perfect condition with a well smoothed sur-

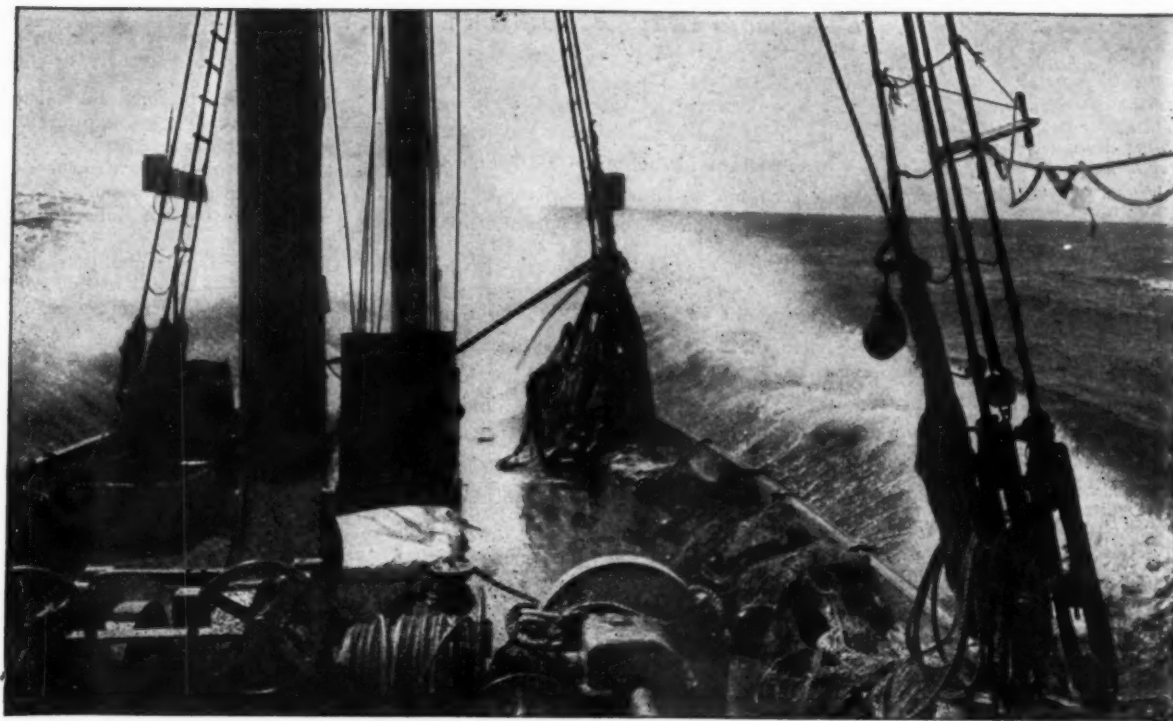
face. And as that lubricating engineer remarked, "That's the most unorthodox thing I have ever tried." Yet it did the job and did it well. But it was something new and uncommon, yet today we are continually finding just such problems to overcome.

Now to go back three or four decades and see why the "Old Timers" statement was true. In those days manufacturers of all types of power plant equipment, Diesels included, built them rugged, with heavy frames, heavy crankshafts big bearings, heavy cylinder liners and pistons and operated them at slow speeds. Even the smaller units were so designed. Units back in that age of power plant equipment were not uncommon, in having a specific weight of anywhere from 50 to 70 lbs. per bhp. developed. With those conditions, lubricants were able to take care of the heat transfer with little difficulty. Operating pressures were lower and with slow speeds the temperatures were correspondingly low.

But manufacturers began to see the light and as these units, especially Diesel units were in more demand for more varied applications, and particularly the applications to mobile units they soon discovered that if they were to get anywhere, they would have to get away from the heavy units and develop units of as great if not greater efficiencies, raise their pressures, as well as speeds and at the same time reduce the specific weight per bhp. developed. This meant that new metal would have to be developed and used which would be lighter but have more tensile strength, bearings would have to be changed, and in fact the whole design revamped. From that time on they have been designing units with that one thought in mind, less weight per bhp. developed, until today we find many units whose specific weight per bhp developed is down to from 18 to 20 lbs.

Other factors entered into the picture. Tolerances and clearances had to be changed, as well as metals, and that meant that new lubricants had to be developed to take care of heat transfer and excessive temperatures which would be the natural consequence of all these design changes. And now please turn to page 88.

* Chief Engineer, Municipal Water and Light Plant, Hillsdale, Michigan.



Homeward Bound ... with an extra day's catch

AFTER several days at sea, this trawler is headed back to port.

The fishermen are tired—their fingers knotty from laying and hauling nets and trawls. They want to get home quickly—with as little effort as possible.

For years these men have had to steer by hand, wrestle with the wheel in rough seas. Now, finger-tip steering, even in the toughest weather, is a welcomed addition for a trawler's weary crew.

A trawler skipper recently wrote that with his Sperry Steering System, turning the wheel from hard right to hard left—a task formerly requiring minutes by hand—is done electrically

in 11 seconds. Due to this improved maneuverability with the Sperry Steering System, the time saved in setting and picking up nets is equivalent to an extra day's fishing in the course of a week!

Finger-tip steering is furnished by the Sperry Electro-Mechanical System—providing virtually effortless power steering, yet permitting instant shift-over to manual steering in case of power failure—or by a simple controller type for power steering only.

At present, most Sperry Steering Systems are going into ships headed for war duty. That's why there sometimes is delay in filling commercial orders.



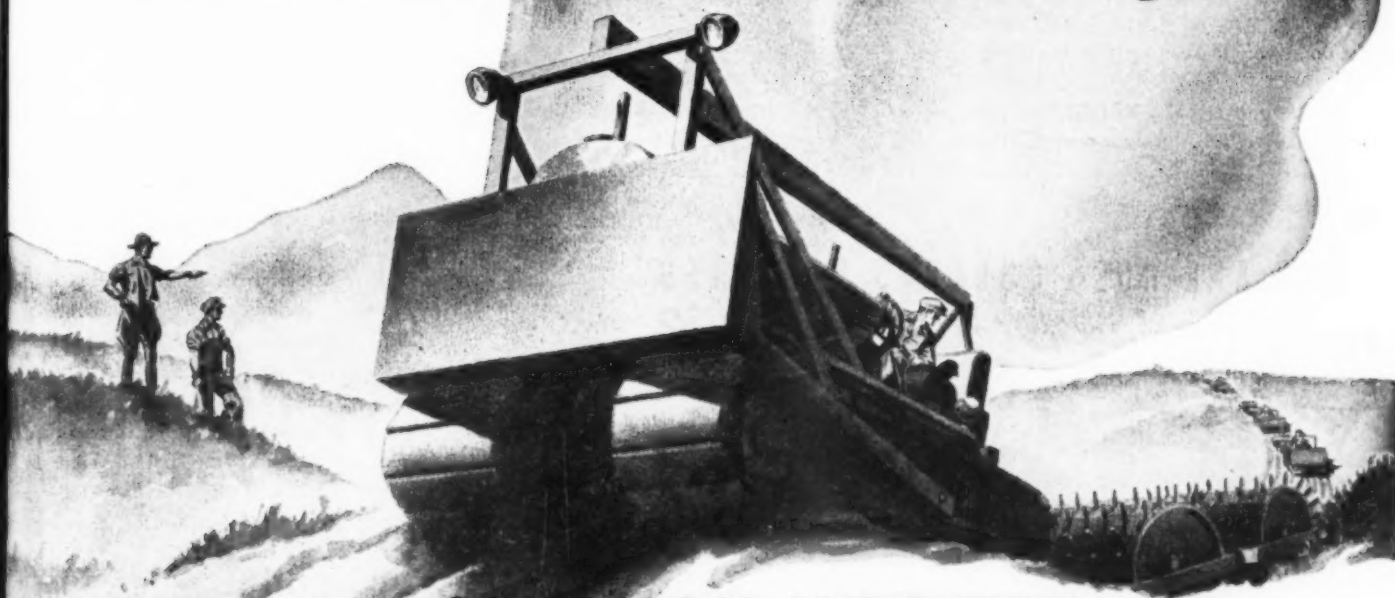
The Sperry Electro-Mechanical Steering System is economical, rugged, and dependable. In the case of 32 installations where careful records were kept, maintenance costs for this equipment averaged only eight dollars per year.

Sperry Gyroscope Company INC.

GREAT NECK, NEW YORK • DIVISION OF THE SPERRY CORPORATION

GYROSCOPICS • ELECTRONICS • RADAR • AUTOMATIC COMPUTATION • SERVO-MECHANISMS

Parts with guts for the job



McQUAY-NORRIS **ALUMINIZED** **PISTON RINGS**

In trucks, tractors, locomotives, ships... wherever there is work for Diesels, McQuay-Norris parts are giving efficient, dependable, economical performance. With 34 years' experience in precision manufacture, McQuay-Norris includes the Diesel field in its achievements in metallurgical development, heat treating, clinical research and engineering design. Send us your blueprints.



*Awarded to two plants
McQuay-Norris Prod.
Management Division*

McQUAY-NORRIS

MANUFACTURING COMPANY

ST. LOUIS, MO.



PRECISION WORKERS IN IRON, STEEL, ALUMINUM, BRONZE, MAGNESIUM

Specialized Lubrication;

Continued from page 82

changes. Many of the new metals required special lubricants due to their oxidizing effect on existing oils. Many bearing metals are allergic to small particles of dust and dirt which did not bother in the old heavy bearings and lubricants. So it developed into a race between the designer and the lubricating engineer, the one trying to keep up with the other.

In the next issue of DIESEL PROGRESS, the writer will take up and illustrate many of the

changes in the average design of several of these units, and show how they effected the lubricating problem and how these lubricating problems have been overcome. When one gets the inside picture and knows what progress has been made in design and development of the modern Diesel and how the application of Diesels to all types of equipment from heavy stationary units to the fast moving mobile units of our army and navy, we can readily see why it is necessary to be critical of the lubricants used, and why specialized lubrication is not a fad but a necessity.

"HOW ARE ROSS COOLERS DESIGNED TO MASTER *Any Diesel Problem?*"



"All parts are standard, yet specially assembled to meet individual performance needs. The "CP" design is for larger cooling requirements, and the "BCF" for smaller. Both have exceptional provisions for easy maintenance, mounting in any position and diversified piping arrangements. The construction is strong and compact—requiring minimum space."

ROSS HEATER & MFG. CO., Inc.

Division of AMERICAN RADIATOR & Standard Sealing Corporation

GENERAL OFFICES AND PLANT: 1425 WEST AVENUE, BUFFALO 13, N. Y.



"CP" BULLETIN 5322
"BCF" BULLETIN 4922
fully illustrated, and give complete data on design features, sizes, materials and performance.
WRITE FOR EITHER OR BOTH!

Maintenance Schedules

Continued from page 84

"A maintenance log book is a convenient method of keeping record of when certain work maintenance was done. This may be made with a check sheet for each unit and one for the auxiliary equipment, each sheet serving for one year, being vertically ruled for the twelve months, and cross ruled with the items of maintenance. Another sheet for each unit and auxiliaries should be carried, showing the date and cost of repairs.

"As only a few of these forms are used each year, the most economical method of obtaining them is to type and rule the forms you need on tracing paper and have blue line printed on white paper. A single loose leaf binder will hold several years' record of the maintenance and repair costs of your individual units. Operators are given certain engines to maintain and are held responsible for their maintenance. General overhauls are not covered by the maintenance schedule. However the work is posted on the maintenance log, showing date, material used and costs."

The foregoing setup of maintenance log sheets as used by the Municipal Utilities plant, under Mr. Watts' supervision is typical of many plants logs as a help on maintenance. However plans and equipment vary to such an extent, that each supervisor, by following this method could substitute his items, making additions or changes suitable to making such a sheet applicable to his plant.

Diesels Go To War

Continued from page 67

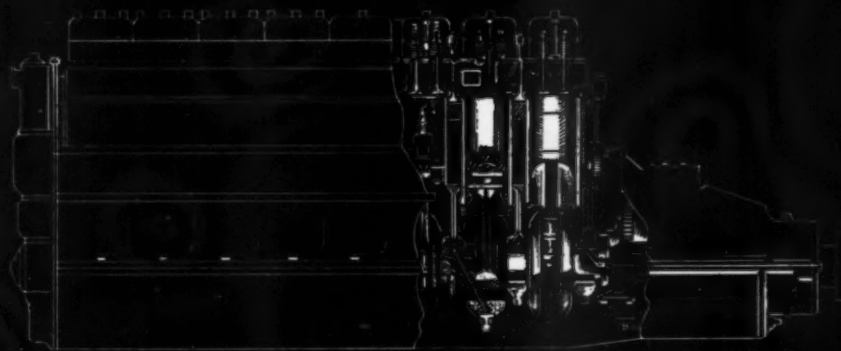
This unit consists of a pair of 6-cylinder engines placed side by side with the exhaust manifolds together, and the essential accessories, including blowers, fuel pump, water pumps, oil coolers, air cleaners, secondary oil filters, and governors all on the outside. The engines are joined together by means of a heavy junction plate at the front end and a double clutch housing and gear unit at the flywheel end. Each engine has its own lubricating oil, and water cooling system.

Separate clutches are interposed between each engine and the gear step-up unit. Provision is made for locking out either, by a control on the instrument panel. In this way it is possible to secure the maximum horsepower performance on both engines, or to operate on either engine singly, as desired.

Here was a new total of Diesel horsepower applied in the space originally designed for

EXAMPLE OF *Service* :

One of our Cities Service Engineers writes:
 "We've been lubricating the Diesel engines
 owned by the Consumers Steel and Supply
 Company, at Racine, Wisc., for four years
 (about 43,200 engine hours) and at no time
 has there been trouble traceable to lubrication.
 Engines are always free of carbon and
 never show ring-sticking...even though the
 Diesels carried full to over-loads 60% of
 the operating hours."



More and more, it's service that counts...

and *Cities Service* means good service!



CITIES SERVICE OIL COMPANY

ARKANSAS FUEL OIL COMPANY

allotted for use with the radial air cooled, gasoline engine; in the General Grant (M3), and General Sherman (M4) tank, and M10 Tank Destroyer.

It is also interesting to note another development which has been born during the war relating to the preconceived line of demarcation between the gasoline and Diesel engine. We know that the gasoline engine has a compression ratio of say, 5 or 6 to 1, whereas the Diesel engine is 16 to 1, and that as we advance

beyond 6 to 1 in the gasoline engine, anti-knock properties have been added to the gasoline to permit operation at higher compression ratios. However, it has been found possible to inject gasoline in the exact same manner as Diesel fuel; that is, into a 16 to 1 compression ratio. As a matter of fact, when the gasoline is injected into the hot air of the combustion space, ignition of the gasoline takes place slower than when Diesel fuel is injected. This is contrary to what many might have expected. Knowing gasoline to be such a volatile fuel,

engineers visualized that the injection of gasoline into the 16 to 1 compression ratio would blow the heads off, but this is not so. Experimental ordnance vehicles have been constructed with two fuel tanks, one containing Diesel fuel and the other gasoline, so the Diesel engine could operate on either gasoline or Diesel fuel. The economy in the consumption of gasoline using it this way in the Diesel cylinders compared with the normal carburetor engine, can be shown by the figures of 10, 14 and 16 miles to the gallon; 10 miles per gallon being the consumption with the carburetor engine, 14 with gasoline injected into the Diesel cylinders and 16 with the straight Diesel engine. This type of project, however, has not as yet reached the practical application stage.

The development of multiple engines did not end with the "twin." The larger type of invasion craft required engines of still greater power. What had been done once to "double" the horsepower could be done again. The result was the "quad"—which is four 6-cylinder engines all coupled together delivering power to a single driveshaft for use in the LCI (Landing Craft Infantry).

This particular type of landing craft is the one which has been used most extensively in the invasion of France. Eight six-cylinder Diesels arranged as two "quads," drive her two propellers. Each "quad" develops 900 horsepower and has its own gear box, propeller shaft, propeller, and variable pitch control. The weight is about 12.5 pounds per horsepower developed.

There is no doubt that this principle of combining basic engines into multiples will be used in peacetime applications. As for example, in the logging industry or on rigs for drilling oil wells. Where greater power is required at times than is afforded by a single engine, a "twin" or "quad" will be available. Twin engines might be used in earth moving type of equipment. Similarly, in the fishing industry the 20-foot to the 150-foot tuna clipper could utilize multiple engines, singly or in multiple combination. In the event of failure of one engine, the offending engine can be readily cut out as an operating unit relative to the others, permitting the boat to make its catch and return to port. Incidentally, the first two commercial installations of this multiple type of engine have recently been completed.

Accelerated by the war, well over 20,000 h.p. of these small engines have been manufactured for industry, the Army, and the Navy. It is no longer a secret that the total develop-



Twin Disc Hydraulic Couplings are fabricated from sheet steel formed and welded into solid units. This type of construction not only weighs, on the average, 30% less than the cast iron type, but also gives you these added advantages:

1. *A more responsive coupling*—easier to get in motion—easier to stop because there is less inertia—less "flywheel effect."
2. *Minimum axial length*—this means a more compact unit.
3. *Increased capacity and efficiency* because more blades can be used in the same space.
4. *Less skin friction* of the fluid within the unit because of the comparative surface smoothness of sheet steel as against unmachined castings.
5. *Can be operated at higher speeds*, thus increasing the h.p. capacity for a given size.

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin
(Hydraulic Division, Rockford, Illinois).

A NEW BULLETIN for engineers, designers and builders of industrial machinery is now ready for distribution. Write for your copy of Bulletin No. 136.

Reduction Gear



Power Take-off



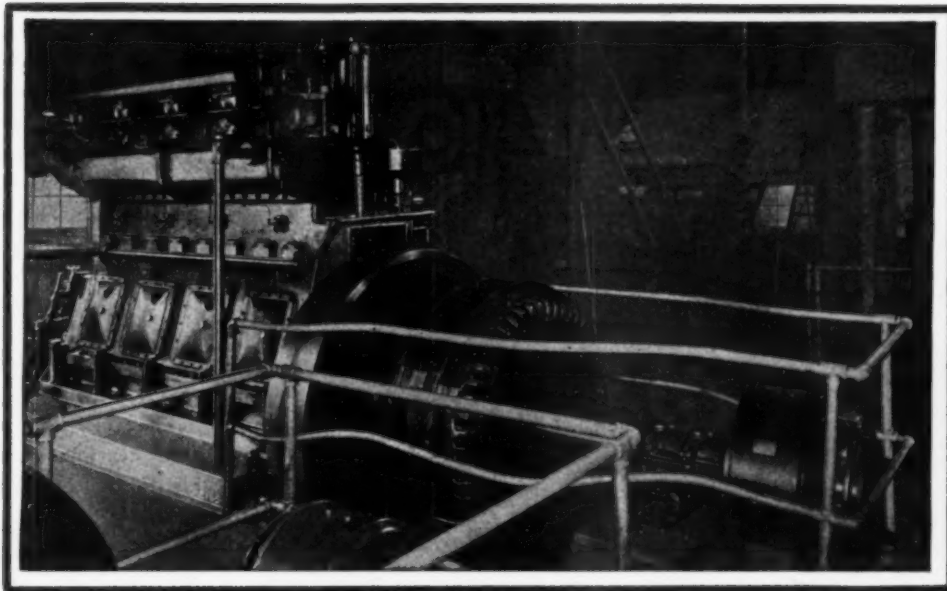
Marine Gear



TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

LET'S LOOK AT THE RECORD...



**In 10 Years This Worthington Diesel Delivered 8,511,660 KW. HRS.
—Running 96.5% of Elapsed Time On Toughest Oil Field Service**

Performance of Worthington Diesels under some of the severest service conditions in Industry . . . is a good indication of how they will perform in your plant.

For instance, this 4-cycle, heavy-duty engine furnished power for motor-driven water pumps repressuring oil wells, and for two or three 25/65 hp. motors usually used on drilling rigs . . . during 10 record years in Bradford, Pennsylvania. Resold, it is still giving satisfactory service today.

For full details, write for Bulletin RP-203, a reprint of an article in a leading Diesel publication.

HANDY GUIDE TO DIESEL COSTS AND APPLICATIONS

Send also for "Diesel Engines", an informative discussion by a Worthington engineer. It describes how to estimate costs of different types of power . . . gives facts on Diesel power progress and applications, on pipe lines, in water works, for refrigeration, air conditioning and general industrial service. Ask for Bulletin WG1-74.

Worthington Pump and Machinery Corporation,
Harrison, N. J.

Ten-Year "Box Score" of a Worthington Engine

Total KW. hrs. generated. . . . 8,511,660
Running-engine-capacity factor . . . 95.0%
KW. hrs. per gal. fuel 11.7
Rated engine hp. per gal. lubricating oil 2064
Total 10-year cost of engine repairs . \$708.00
Average liner wear per
10,000 hrs. 15/10,000 inches

Total 10-year cost of generating power, including labor, fuel oil, lubricating oil, repairs and supplies, interest, amortization, overhead, taxes and insurance . . . 9.68 mills per KW. hr.

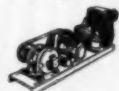
WORTH BEHIND THE NAME WORTHINGTON



Evaporative Type
Engine Water Cooler



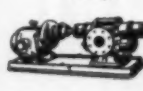
Starting
Air Compressors



Cooling Water
Circulating Pumps



Oil Transfer
Pumps



Diesel engines, 150 to 2,600 hp.
... gas engines, 175 to 2,880 hp.
... convertible fuel engines, 150
to 1,720 hp.

DE-42

Diesel horsepower in the Navy passed that of steam last October.

While at the moment the part Diesels are playing in invasions holds the spotlight, the utilization of the engine spreads far beyond the beach-heads. Here is the list of just those uses of Diesels we are permitted to mention: Submarines and Submarine Mother Ships; SC Subchasers; 131 and 171-foot PC Subchasers; DE Destroyer Escorts; Minesweepers; Rescue vessels; Tankers; Diving Tenders; Landing boats

and Barges; Tank and Cargo Lighters; Dredges; Tank and Tank Destroyers; Tractors and Bulldozers; Shovels; Standby and portable generator sets; Dock Compressors; Lighthouse service; Buses and Trucks.

In presenting to you the story of Diesels at War, you have actually witnessed a preview of post-war Diesel power—the very best products that could be produced from the minds and hands of men, and basic engines in various sizes, most of whose parts are interchangeable, engines

whose simplified design is conducive to standardization of parts and service, where a user such as a contractor, may adapt the same basic engine to his many requirements such as tractors, shovels, etc.

Today all over the world American machines are fighting a war of destruction so that with Victory they may devote themselves to reconstructive, lasting, peacetime efforts. When the battle for freedom is won and our men return home these implements of war will provide with tried and proven products for peacetime applications. They will be ready for new adventures. People everywhere will discover there has occurred an astounding revolution in the world of mechanical power.

New Penn Chief Engineer

DONALD G. CAMERON, well-known electrical engineer, has been appointed recently to head the Engineering Department of Penn Electric Switch Co., Goshen, Indiana.



While we are making a definite and unique contribution to the war effort through our own and exclusive specialized field of Microscopic Precision Tools, we are at the same time perfecting new tools and services with a view to filling the even more vital needs of the better times that are surely coming. Yes, we will be ready with our highly specialized kind of contribution to the better things that the better days we are all looking for will be made of. In the near future, we shall announce a new service to Diesel operators—watch for the announcement that will save time and money and improve Diesel efficiency.

"The Only Business Of This Kind In The World"

National Jet Company

115 MILTON PLACE

CUMBERLAND

MARYLAND

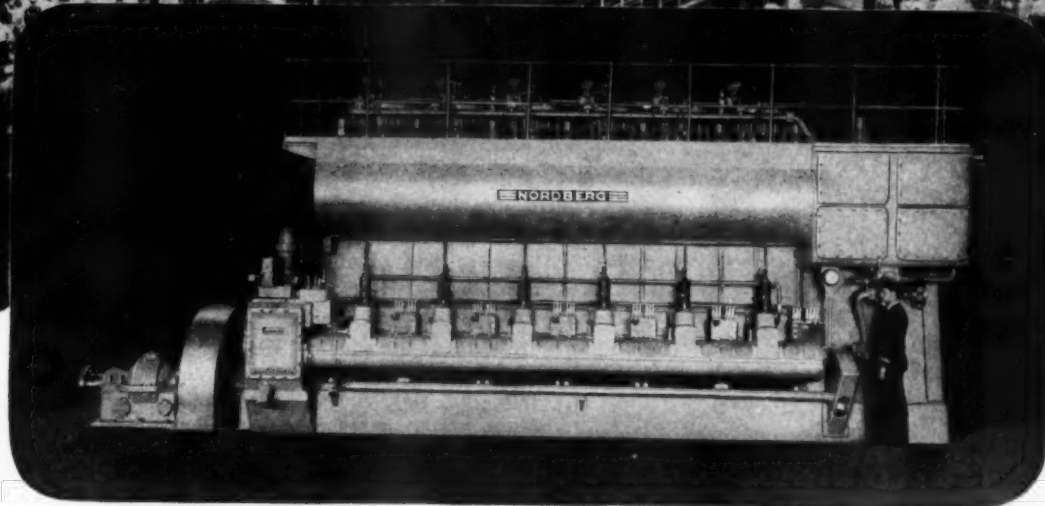


Donald G. Cameron

In selecting Cameron for this highly important job, the company acquired the services of a man who is not only well-versed in scientific engineering design but is also experienced in modern manufacturing methods. Cameron, a graduate electrical engineer, formerly was associated for 15 years with General Electric Company and in recent years, was superintendent of the company's Aircraft Instrument Division at Lynn, Mass.

Cameron, in his capacity of Chief Engineer, will be directly in charge of all engineering work on Penn's products which include automatic controls for heating, refrigeration, pumps and air compressor service as well as safety controls for internal combustion engines.

Another Launching- **ANOTHER NORDBERG DIESEL PROPELLED SHIP**



Don't say DIESEL -
say **NORDBERG**



● This 4000 ton coaster recently launched is one of 161 vessels of this type propelled by Nordberg Diesel engines. The propelling plant consists of a single Nordberg standard engine normally rated at 1700 S.H.P. at 180 R.P.M. and is direct connected

to the propeller shaft. While these vessels today will serve a wartime need, they will prove valuable additions to American shipping when peace comes. A wide range of Nordberg Diesel sizes are available. Investigate their advantages.

NORDBERG MFG. CO., MILWAUKEE 7, WISCONSIN



NORDBERG

DIESEL ENGINES



Borg-Warner Implements Its Post-War Employment Plans

DIRECTORS of personnel in more than 20 Borg-Warner plants, who have accepted responsibility in the corporation's post war plans for reinstatement of returned service men and women, are going to learn something of their undertaking from the veterans themselves.

They met with patients at Percy Jones Readjustment Center, Gull Lake, Mich., on Nov. 13, to learn from the "Vets" exactly what they

wish for at work, at play, and in their homes of the future. "This will be a regular monthly meeting of our personnel directors from divisions in Illinois, Indiana, Michigan, New York, Ohio and Wisconsin," a Borg-Warner official explained.

"At previous meetings, the personnel directors concluded that it is they—rather than the veterans, who are the so-called problem child of post war employment." He added that the corporation itself has gone "all out" to aid the

supervisory staffs which will be in personal contact with employees readjusting themselves to civilian life.

The meeting at Gull Lake, near Battle Creek consisted of a half-hour's chat and dinner with the veterans now at Percy Jones Readjustment Center. It was arranged through the cooperation of the U. S. Army.

Borg-Warner launched its plan for reinstatement of veterans four months ago in recognition of industry's responsibility to the men and women in military service. Many ex-service employees already are at work in productive capacities, the corporation reports.

Dresser Industries Acquires International-Stacey

OSCAR M. HAVEKOTTE of Columbus, O., has been elected a director of Dresser Industries, Inc., President H. N. Mallon recently announced. Mr. Havekotte, for the past four years president of International-Stacey Corporation and of International Derrick and Equipment Company, both Columbus concerns, will continue as head of the latter company.

A native of Millvale, Pa., Mr. Havekotte was educated at the University of Pittsburgh. In 1906 he began his business career with Carnegie Steel Co. He rose to be assistant treasurer of Carnegie-Illinois Steel Corporation, leaving that post in 1940 to assume his present position. He is a trustee of the Columbus Industrial Association and a director of the Petroleum Equipment Suppliers Association.

Dresser Industries has acquired the assets of International-Stacey Corporation, which will be dissolved, and of its subsidiaries, which will continue in operation. The acquisition gives Dresser Industries, Inc., a leading position among manufacturers of equipment for the oil, gas and water fields. The 10 companies now comprising the Dresser group manufacture a completely rounded line of products, from pipe couplings to large pumps, blowers and compressors. They include derricks, drilling apparatus, radio and airport towers and equipment, gas storage tanks and gas-fired home heating equipment.

As International-Stacey winds up its corporate affairs, its factories and those of its subsidiary companies will continue in full operation without change of local managements. International Derrick & Equipment Co., Roots-Connorsville Blower Corp. and Stacey Bros. Gas Construction Co. become new units in the Dresser group, each continuing to operate under its own name.

DIESEL LOCOMOTIVES NEED THE PROTECTION PROVIDED by KORFUND VIBRATION CONTROL



STOPPING transmission of Diesel vibration improves engine efficiency, reduces maintenance costs and helps to maintain the energy and alertness of personnel. It prolongs the life of both the locomotive and its engines.

Transmission of engine vibration can be stopped—once and for all—by Korfund Vibration Control. Employing a combination of steel springs and adjustable resilient checks, Korfund Isolators in addition

to preventing vibration transmission also compensate for the external forces resulting from the starting, stopping and swaying of the locomotive.

Why not investigate the many advantages of this cost saving, efficiency improving, vibration control service? Korfund engineers will be glad to make recommendations . . . without any obligation on your part. Write today for descriptive literature.

THE KORFUND COMPANY, INC.

48-28 Thirty-second Place, Long Island City 1, N. Y.
Representatives in Principal Cities



Typical Korfund Vibration Isolator. Top plate has been removed for lower illustration to show arrangement of springs and resilient checks.



Maybe a Touchdown

Hamilton Steam and Diesel Engines, Cannon and the Machine Tools to make them.

BUT KEEP THAT GUARD UP!

GENERAL MACHINERY CORPORATION

HAMILTON, OHIO

THE NILES TOOL WORKS COMPANY • THE HOOVEN, OWENS, RENTSCHLER CO. • GENERAL MACHINERY ORDNANCE CORPORATION



Honan-Crane "M" Type (Multiple Cartridge) Purifier

HONAN-CRANE "M" type purifiers are designed to use single or multiple cartridges in standard groupings of 1, 3, 4, 6, 8, 10, 14, 18, 20, 24 and 38 according to the capacity needed. The engineering design of this purifier makes it highly effective in marine and many other types of installations.

Some of the outstanding features include: High Flow Rate, Cartridge Type Refill Elements are

used in standard size 7-5/16 x 18, direct connected or bulk station use, uses either Fullers Earth or Navy type cotton waste cartridges, used cartridges easy to remove and replace, cartridge when loaded with contamination weighs approximately thirty pounds and is easy to lift from purifier, double decking of two cartridges saves valuable floor space, operation of purifier, with exception of changing cartridges is entirely automatic and does not require additional labor to operate, necessary heat can be supplied by either electric heater

bands, water or steam, entire unit is compact and takes up very little floor space, pump and motor can be mounted in base.

Several recent changes in engineering design have greatly simplified the changing of cartridges in these purifiers. Cartridges can be removed by turning knob which unlocks the handle from the center tube. Handle is lifted off and cartridges are easy to lift off of the center tube. New cartridges are slipped on the center tube and handle locks in position. Spring on handle securely holds cartridges in position.

Mid-Continent Announces Post-War Marketing Plans

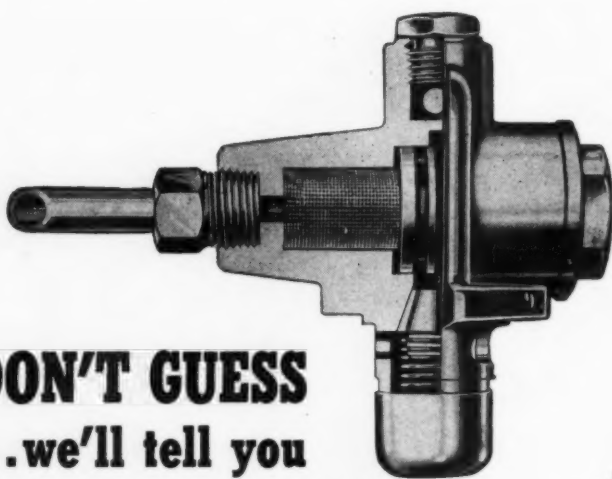
THAT Mid-Continent's post-war marketing plans are progressing from the blueprint to the execution stage is evident in the creation of a new lubrication sales department charged with responsibility for intensifying and extending the company's domestic distribution of automotive, industrial and aviation lubricants.



J. W. Basore

Manager of the new department is J. W. Basore. While a new comer to the organization, Basore is a man of wide and varied experience and accomplishment in lubrication engineering and sales. A native of Birmingham, Alabama, he is a graduate of Alabama Polytechnic Institute in mechanical engineering and a post graduate of the University of California in petroleum engineering. He was eight years with Gulf Refining Company as division superintendent of industrial sales, and for the past three years has been district lubricating engineer at Birmingham for the Texas Company.

Support for the sales activities of the new department includes:



**DON'T GUESS
...we'll tell you**

This is a "cut-away" view, actual size, of the VISCO-METER* —6 ounces of precision equipment which, when installed on any engine...gasoline or Diesel...becomes the protector or "watch dog" of engine lubrication. Through a gauge (not shown) the engine operator has

a constant visual report indicating whether or not the engine and all its working parts is being adequately lubricated. VISCO-METER'S*, exclusively, have been rendering this valuable service since 1928. They're available again for peacetime engines.



...and this is a booklet we have prepared to tell every design engineer, manufacturer, distributor, or user of gasoline and Diesel engines the entire story of VISCO-METER*. Write, wire or phone for your copy. If you say so, a VISCO-METER* engineer will deliver it.

VISCO-METER
CORPORATION

BUFFALO 7, N. Y.

*Fully covered by U. S. and Foreign Patents

is compact
pump and

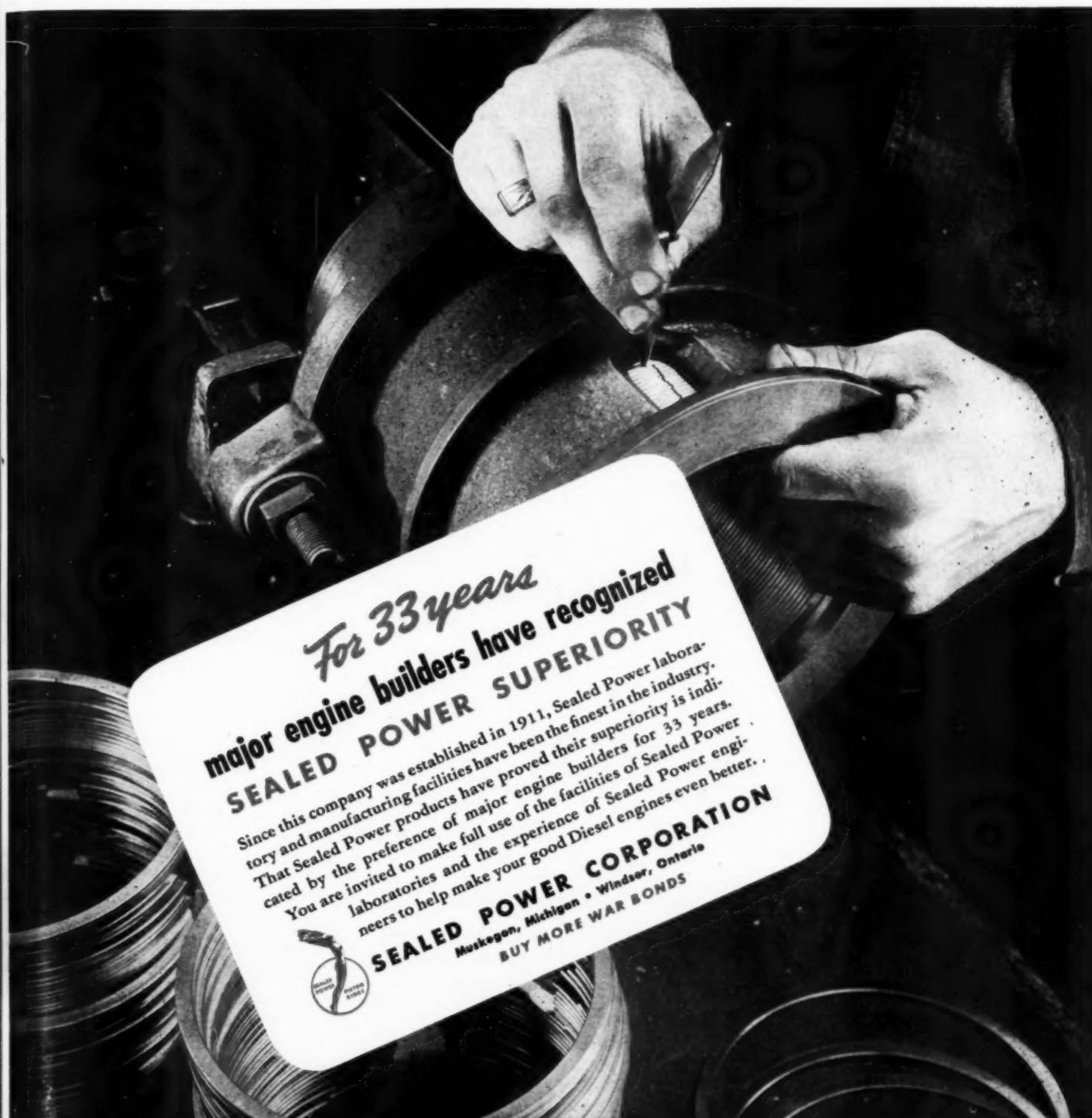
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EL PROGRESS



For 33 years
major engine builders have recognized
SEALED POWER SUPERIORITY

Since this company was established in 1911, Sealed Power laboratory and manufacturing facilities have been the finest in the industry. That Sealed Power products have proved their superiority is indicated by the preference of major engine builders for 33 years. You are invited to make full use of the facilities of Sealed Power laboratories and the experience of Sealed Power engineers to help make your good Diesel engines even better.



SEALED POWER CORPORATION
Muskegon, Michigan • Windsor, Ontario
BUY MORE WAR BONDS

SEALED POWER PISTON RINGS

PISTONS—CYLINDER SLEEVES

1. A technical advisory service from the refinery laboratories embracing product specifications, recommendations for use and cooperation in the development of new or improved products to meet market needs.

2. Such sales promotional aids as the recently inaugurated Selective Selling Program and its accompanying Preventive Maintenance Plan for automotive fleet operators.

3. A program of trade advertising, launched

early this year, in publications circulating in the truck and bus transportation, aviation, industrial and oil marketing fields. Magazines carrying this advertising include FLEET OWNER, COMMERCIAL CAR JOURNAL, DIESEL ENGINE CATALOG, AVIATION NEWS and NATIONAL PETROLEUM NEWS.

Baldwin Changes Diesel Service Personnel

THE Baldwin Locomotive Works in an en-

deavor to give the railroads more adequate assistance in the maintenance of their Baldwin Diesel Electric Locomotives and Diesel engines, have made the following changes in their service supervision: S. W. Moser has been appointed Diesel Service Manager, with headquarters at Eddystone, Pa.

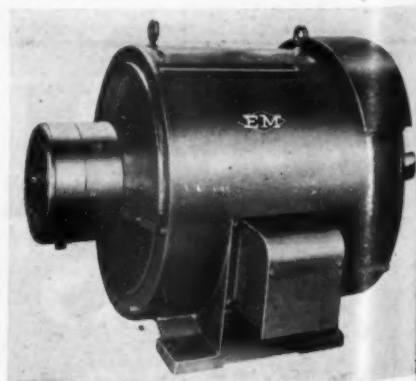


S. W. Moser

J. F. Kirkland has been appointed Regional Supervisor of Diesel Service of the Western Region of the United States, with headquarters at 627 Railway Exchange Building, Chicago, Illinois. G. W. Burnett has been appointed Regional Supervisor of Diesel Service of the Eastern Region of the United States, with headquarters at Eddystone, Pa.

New E-M High-Speed, A-C Generators

A NEW line of high-speed a-c generators has been announced by Electric Machinery Company. Built in sizes 18.7 to 125 kva, 180 to 514 rpm., for standard voltages, 1, 2, or 3 phase, 50 and 60 cycles, 80% power factor, 50°C. or 40°C. rise, these generators are supplied as 2-bearing units for belted or coupled duty, or single-bearing for direct coupling to driving engine. Drip-proof generator construction is standard.



The new E-M, high-speed, A-C generator.



JUST as the horse gave way to the horseless carriage—just as inevitably as the old always gives way to the new—tomorrow's engines are bound to be diesels! Because the fundamentals that are making diesels help win battles today are the fundamentals that will make the new light weight diesel the answer to postwar air transportation. Cheaper fuel, lower fuel consumption, no ignition system, minimum fire hazard and dependable operation at all times—these are the advantages that will make the diesel America's foremost engine for fast, low-cost transportation in tomorrow's peacetime world.

Producers of oil tools, oil heating units, aircraft parts and diesels



U.S.A.

Guiberson



Established 1919

THE GUIBERSON CORPORATION
GUIBERSON DIESEL ENGINE COMPANY
DALLAS, TEXAS

You can use this improved Romec Pump if...



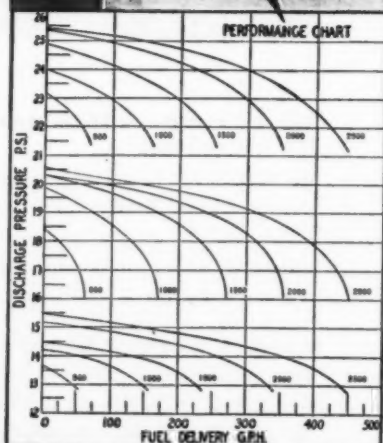
CAPACITY

400 gal. per hr. at 2500 rpm.

6 to 35 lbs. pressure
per sq. in.

Weight only 2¾ lbs.

Balance type relief valve
with shaft seals.



If you can use higher fluid pressure you can save time. This pump has a capacity of 400 gal. per hr. at 2500 rpm. Suppose you save only 2 man-hours a day per pump; that means a saving of from \$40 to \$60 a month.

Higher pressure range may also help you. This G-9 runs from 6 to 35 lbs. per square inch. Furthermore it weighs less — only 2¼ lbs. Its balanced type relief valve with shaft seals are dependable through extreme ranges of temperature. A precision built pump noted for its unfailing dependability, but only one of many in the ROMEC line. In writing kindly tell us about your requirements so we can advise you on the model best suited to your needs.

ROMEC PUMP COMPANY
104 ABBEY ROAD
ELYRIA, OHIO, U. S. A.



Domec
NON-PULSATING
PUMPS... ACCESSORIES

The generators are also available as "packaged" units, with controls mounted on generator frame, and wiring factory-connected. "Packaged" generators are compact, easily installed, and suitable for portable or stationary service. "Packaged" controls consist of a NEMA Class 1 metal enclosure, housing the E-M Synchrostat voltage regulator and meters. No switchgear required; run only three wires (for 3 phase) to the load through the generator switch. Quick-responsive action of the Synchrostat minimizes voltage dips, automatically holds voltage at

nameplate rating (plus or minus 2% accuracy).

Ventilating air of generator is supplied by E-M "Pol-Aire" ventilating system. A suction-type fan at the drive end of the generator pulls a large volume of ventilating air through both the direct-connected exciter and the generator. Proper ventilation of windings on field poles is assured, eliminating possibility of interior "hot spots." The intake of ventilating air is at the exciter end, opposite the driving engine on direct-coupled units, preventing circulation

of heated air. Standard direct-connected exciter is of quill type, mounted on an extension of the generator shaft, compact, and of drip-proof construction. Top-mounted exciters, with protected V-belt drive, are furnished on certain speed ratings below 1200 rpm.

Write Electric Machinery Mfg. Company, Minneapolis 13, Minnesota, for copy of Publication No. 177.

A. C. Estep Joins Atlas

A. C. ESTEP, widely known throughout the Diesel field recently rejoined Atlas Imperial Diesel Engine Co. after a 30-year absence during which he has been active in Diesel engine design and manufacture. Regarding the change, Mr. Estep expresses his feelings as follows: "Accepting this position was kind of like returning home to the writer who had worked for this company 30 years ago for several years prior to 1914. At that time I helped them sell and install the first Atlas Marine Diesel engine, which, as you know, is still operating successfully on the Pacific Coast."



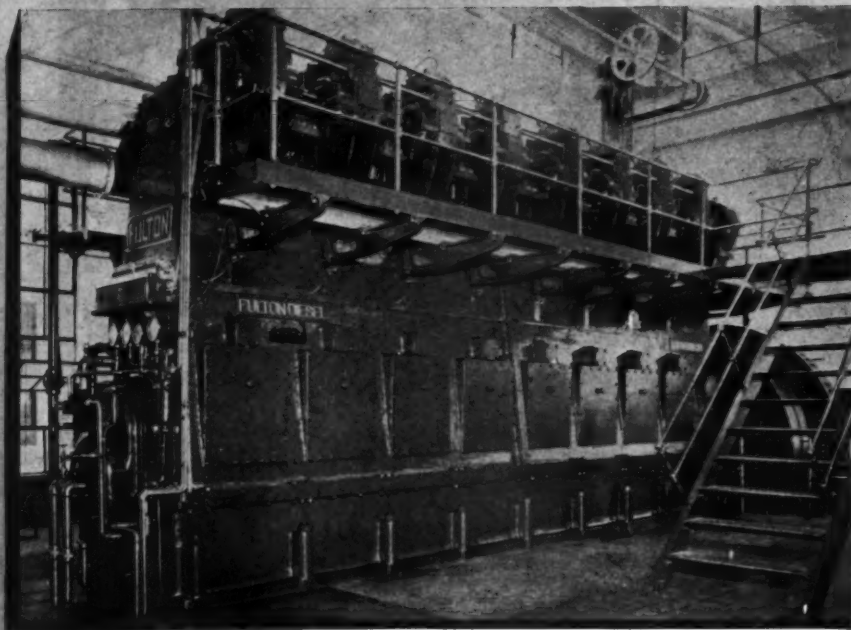
A. C. Estep

Dresser Moves Headquarters To Cleveland

DRESSER Industries, Inc., will move its headquarters from Bradford, Pa., to Cleveland, Ohio. H. N. Mallon, president, announces Executive offices will be located there in the Terminal Tower.

Cleveland already is the home of a Dresser Industries' member company, the Bryant Heat Exchanger Co., and of an affiliate, Van der Horst Corp. of America. Dresser Industries, Inc. is the parent corporation of a group now comprising 10 companies, all in related lines of manufacture.

SUCCESSFUL ENGINE BUILDERS 1852 FOR 92 YEARS 1944



Ninety-two years is a long time — yes, not far from a century of Engine Building Experience — to back up the Fulton Diesels we shall build for the peace-time World. In better than nine decades we have learned how to design and build Diesels for long, carefree, dependable and profitable service — with nothing left to guess work. These characteristic qualities of Fulton Diesels have been demonstrated in practically every type of stationary application — continuously for many years.

625 H.P. to 2000 H.P.

FULTON IRON WORKS CO.
• ST. LOUIS • MISSOURI •

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The factory of the Dresser Manufacturing Division at Bradford, up to now the parent corporation of the Dresser group, will remain in Bradford and operate as Dresser Manufacturing Division of Dresser Industries, Inc. Other member companies in addition to those in Cleveland include Clark Bros. Co., Inc.; Pacific Pumps, Inc.; International Derrick & Equipment Co.; Roots-Connorsville Blower Corp.; Stacey Bros. Gas Construction Co.; Bovaird & Seyfang Mfg. Co.; and Dresser Manufacturing Co., Ltd.

New Source of Diesel Fuel?

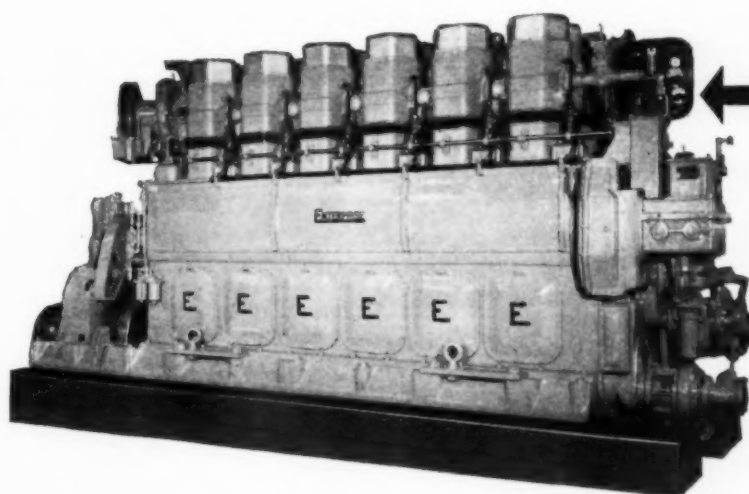
THE October 30th edition of *Business Action*, a weekly report from the Chamber of Commerce of the United States, under a paragraph title of "Makeshift Fuels" points to the use of a Diesel fuel that is distilled from alligator tails in Brazil. Since Diesels have operated on a wide range of fuels all the way from potato peelings to powdered coal, we now have only to add alligator tail distillate to our growing hedge against depletion of conventional fuel supplies. We may even see fuel rate specifications written on the basis of alligator tails per hp. hr.

Caterpillar President Honored

L. B. NEUMILLER, President of Caterpillar Tractor Co., Peoria, Illinois, was elected a member of the Board of Trustees of the Illinois Institute of Technology and Armour Research Foundation at the annual meeting held in Chicago early in October, it was announced by James D. Cunningham, Chairman of the Institute.

The Institute was formed in 1940 by a merger of the Armour Institute of Technology and Lewis Institute, both schools being founded about fifty years ago with similar original aims. Their purpose was then and is now "to serve the nation, its youth, and its industries in the functions of technology." Extensive education programs are carried on in engineering, research, and other technical fields.

Caterpillar Tractor Co. has been working with the Illinois Institute since 1938 on a 5-year co-operative training program. In that year eight apprentices were selected to participate. Co-operative students alternately spend four months at the factory and four months at school, and to date forty-five young men have entered in the course, nine having graduated. Participants in the program are selected during their first year of apprenticeship, from the pattern-maker, foundryman or machinist courses at the factory.



Alnor Pyrometers

"a major factor in determining proper engine performance..."

The powerful, long range, V-4 type tugs of the Maritime Commission are powered with twin Enterprise turbo super-charged Diesels.

Not only cylinder exhaust temperatures, but *inlet and exit temperatures of the exhaust gas turbo-blower* are of great importance—a major factor in determining proper loading and proper performance of the engine.

Alnor Exhaust Pyrometers provide for a simple, convenient installation, and assure reliable temperature indications. Afloat or ashore, you will find Alnor Pyrometers rendering unfailing service with Diesel and large gas engines of many types. Write for Exhaust Pyrometer bulletins.

ILLINOIS TESTING LABORATORIES, INC.

420 North La Salle Street
Chicago 10, Illinois

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Cleveland
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Bryant Heat
Horst Corp.
Inc. is the
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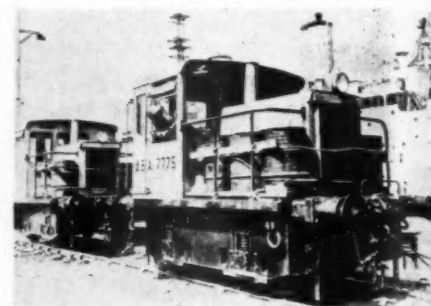
New Metal Hose Booklet

A NEW 12-page booklet featuring Rex-Tube, Rex-Weld, Avioflex and Cellu-Lined and Rex-Flex Bellows has been issued by Chicago Metal Hose Corporation. In addition to descriptions of the above products, the booklet contains complete tables of sizes and specifications, also detailed instructions for ordering flexible metal hose and is profusely illustrated. Write Chicago Metal Hose Corporation, Maywood, Illinois, for your copy of this new booklet.

G-E 25-Ton Diesel-Electrics See War Service in European Theater

QUALIFIED for 24-hour a day duty behind the Allied battlefronts these General Electric 25-ton Diesel-electric locomotives are shown here as readied at a port somewhere in England for shipment across the channel. Manufactured specifically for Army Transportation Corps' work on the continent, they are light enough to travel over the temporary tracks laid down in occupied territories, and are able to carry

fuel and water for long periods of operation.



G-E Diesel electric locomotives in England ready for movement across the English Channel.

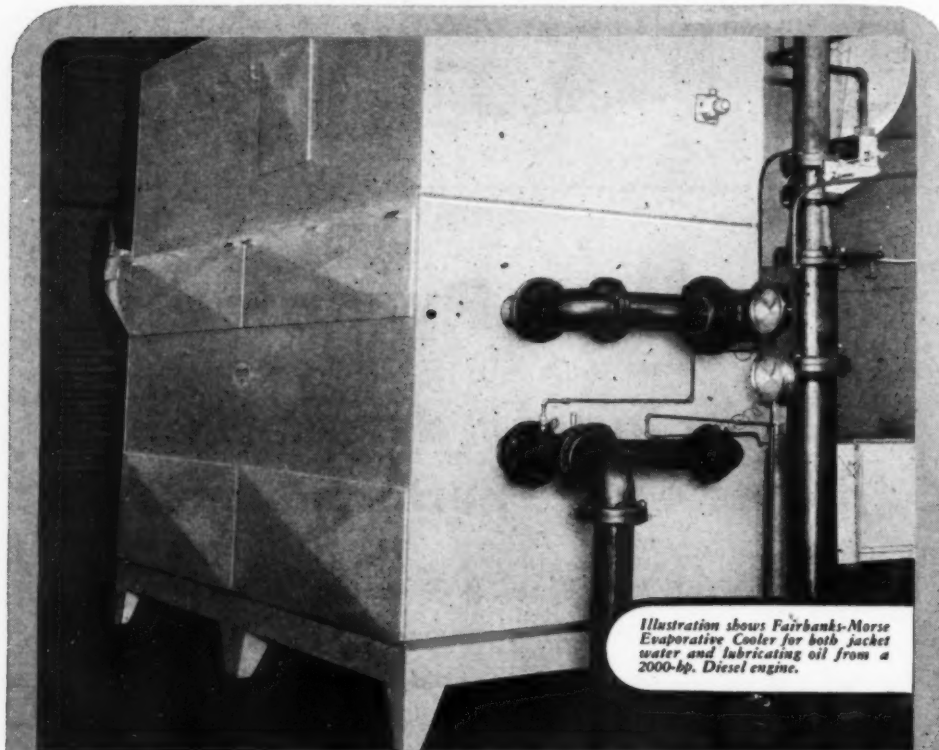


Illustration shows Fairbanks-Morse Evaporative Cooler for both jacket water and lubricating oil from a 2000-hp. Diesel engine.

PLAY SAFE!

Improve Your Engine Cooling System with a FAIRBANKS-MORSE Evaporative Cooler

Don't take unnecessary chances on costly shutdowns!

Investigate—then install—Fairbanks-Morse Evaporative Coolers on your Diesel and gas engines. They assure you of longer engine life, fewer shutdowns, less repairs—more economical over-all performance and protection.

Fairbanks-Morse Evaporative Coolers save water—using actually only 5% of the amount generally required for a continuous water supply.

Write for complete information to Fairbanks-Morse & Co., Fairbanks-Morse Building, Chicago 5, Illinois.



BUY WAR BONDS

FAIRBANKS-MORSE

DIESEL ENGINES
PUMPS
MOTORS
GENERATORS
WATER SYSTEMS
SCALES
STOKERS
FARM EQUIPMENT
RAILROAD EQUIPMENT



Diesel Engine Cooling Equipment

They need little servicing and require only a one-man crew—thus releasing manpower for other important jobs. And because the oil they require for a day's operation weighs only 1/20 as much as the coal required by steamers for the same period, the fuel supply problem is simpler. Before being pronounced fit, these 25-tonners were put through exhaustive tests in England. They are standard G-E industrial locomotives except that the couplers have been changed to the European draw-hook and buffer type, and rail guards have been added to conform with European practice.

Harold F. Allen Now Link-Belt Speeder Chief Engineer

ANNOUNCEMENT is made by Link-Belt Speeder Corporation that Harold F. Allen has been appointed chief engineer for the company, and will divide his time between the Chicago and Cedar Rapids plants.

Mr. Allen became a member of the Link-Belt Locomotive Crane Division in 1916 and during this long period of service with Link-Belt and Link-Belt Speeder he has ably held numerous positions of responsibility. He has contributed many sound engineering ideas to the development of Link-Belt Speeder equipment, notably the Speed-o-Matic type of hydraulic controls which, since 1936, has been the outstanding improvement in the operation of crane and shovel equipment.

He is a graduate of Columbia University, with a degree in mechanical engineering, was secretary of his class and president of the student chapter of ASME. In 1915, he received an appointment as an assistant in the department of mechanical engineering at Columbia, where he was engaged in experimental work until 1916, when he joined the Link-Belt organization in Chicago.

Baldwin Appoints W. H. Russell

APPOINTMENT of W. H. Russell as district manager of the Southwestern District Sales Office of the Baldwin Locomotive Works in St. Louis is announced at Philadelphia.



W. H. Russell

A native of Clinton, Ill., Russell was educated in Chicago and was graduated from the University of Illinois. He served the Illinois Central Railroad for several years and the American Locomotive Co. in Cleveland for seven years, and prior to joining Baldwin was affiliated with the Elastic Stop Nut Corp., of Newark, N. J.

Weatherhead Appoints Executives

THE Weatherhead Company, Cleveland, announces the appointment of L. J. Henderson as assistant general sales manager, and Gene P. Roberts as sales promotion manager.

Henderson joined the company in 1936, and since 1938 has acted as assistant manager of the Aviation Sales Division. He is a member of the Industry Advisory Committee on aircraft fittings, flexible hose assemblies and actuating cylinders, and of the S. A. E. aviation committee.

Roberts, a director of the Industrial Marketers of Cleveland and the Automotive Advertisers Council, came to Weatherhead in 1942, and has directed the company's advertising activities since that time.

Announcement is also made of the relocation of the company's West Coast sales office from 6039 Wilshire Blvd., Los Angeles, to 1736 Standard Avenue, Glendale, where a branch Weatherhead plant is located. Otto Abrams, formerly sales engineer with the Cleveland division, has been transferred to Glendale to assist E. Van Vechten, West Coast sales manager, in the direction of the relocated sales branch.

KILL FIRE this easy way



Randolph "4"

CARBON DIOXIDE FIRE EXTINGUISHER

Few people think about fighting a fire until they actually face one. That's why it's important that every fire extinguisher operates easily—quickly—thoroughly!

Randolph "4" simplifies, speeds fire-fighting. This modern extinguisher with the "breath of ice" chokes gasoline, oil, paint, machine, electric fires—instantly. Hits the blaze before damage is done!

Approved by Underwriters' Laboratories, Inc.

Mobilize against fire with Randolph carbon dioxide protection. For complete details and prompt service, call your supply house, or write us—today.

SEND NOW for free booklet "Sharpshooting at Flames." Illustrates latest techniques in carbon dioxide fire fighting. NAME _____

ADDRESS _____

RANDOLPH LABORATORIES INC.

8 EAST KINZIE ST., CHICAGO 11, ILLINOIS



ONE-HAND ACTION!

Easy! So obvious and easy... any employee can use it. No valves or hoses to twist—no horns to raise!

Fast! Touch the trigger... and powerful carbon dioxide charges into the flames... smothers the fire in a penetrating, snowy blanket!

Safe! Does not damage equipment or conduct electricity.

Neat! Randolph carbon dioxide is dry and odorless. Actually disappears after the fire is out. Leaves no foam or liquids to clean up.

Efficient! Carbon dioxide will not deteriorate. Remains effective in extreme temperatures.

Elliott Issues Bowes Drive Bulletin

A 4-PAGE filing information folder on the new engine type non-reversing Bowes Drive has recently been published by Elliott Company for mailing, upon request, by its Electric Power Department, Ridgway, Pa.

The Bowes Drive is a new electric device for the reduction of speed between modern high speed prime movers and drive shafts, for mechanical applications where gear and coupling

combined are ordinarily necessary. The result of several years of research work by Thomas D. Bowes, M. E., Naval Architect and Marine Engineer, the Bowes Drive is built in two types, reversing and non-reversing, by Elliott Company as licensee.

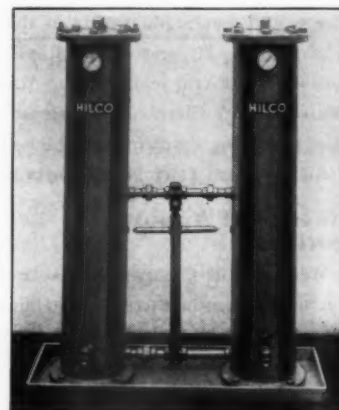
Its immediate application is for ship propulsion where the Bowes Drive is used to reduce (by wholly electrical means) the speed of modern prime movers to the lower speeds required for the most efficient operation of propellers.

The unit also provides power for auxiliary service loads through slip ring take-off circuit and can be used as a source of electrical power for cargo handling and similar functions, when disengaged from its primary job of speed reduction and torque multiplication of propulsion equipment.

The new filing information bulletin contains photographs of the initial unit and its component parts, together with a description of the operation and other data. A sectional drawing through the Bowes Drive, shaded in two colors, is also included.

Small Duplex Hilco Hyflow Oil Filter

THE Hilliard Corporation announces a small line of Hilco Hyflow Duplex lubricating and fuel oil filters. These units are arranged for continuous filtration of lubricating and fuel oil and the design permits installation in lubricating or fuel oil lines to deliver an uninterrupted flow as one half of the unit can be shut off while the other half is being serviced.



Small version of Hilco Duplex oil filter.

These units are made up to receive the Navy standard large filter element made of cellulose suitable for filtering both fuel and lubricating oil. There is also available to fit into the same unit Hilite or fuller's earth filter elements. Hilco Hyflow Duplex filters are available to filter from one gallon per minute up to any capacity desired.

Enterprise Reports Several Sales

LYNCH Shipbuilding Company of San Diego have just purchased four Enterprise Turbo-charged Diesel engines, rated 800 hp. at 400 rpm. for their new 96 foot Baby Tuna Clippers.

CONSOLIDATED Shipbuilding Company of Los Angeles have placed their orders for a number of Enterprise Diesel engines, rated 400 hp. at 400 rpm. for steel Tuna Clippers. Two of



**WHY
GAMBLE?**



In resuming post-war manufacture, no buyer can afford to gamble with inferior sources of supply . . . Consequently—we urge you NOW to choose "Chicago Screw" as your source for Precision Screw Machine Products.

With our up-to-date production equipment, plus modern inspection tools and methods, backed up by 72 years of experience—we have the "Know How" for producing your toughest jobs.

Under one roof, we have complete facilities for producing the most intricate parts (or the simplest)— $\frac{1}{16}$ " to 5" diameter and any length—from any type of material—in unlimited large or small quantities . . . Let our mental and physical capacity help make your post-war problem easier!



THE CHICAGO SCREW CO.

1026 So. Homan Avenue

Chicago 24, Ill.



the Enterprise engines will be furnished to a new boat being built for Capt. Keesig, famed owner of the Sport Fishing Fleet in San Diego.

DAUNTLESS Towing Lines of New York will repower their *Dauntless No. 12* with an Enterprise Turbocharged Diesel engine, rated 1200 hp. at 300 rpm.

THE Victoria Tugboat Company of Victoria, British Columbia will install an Enterprise Diesel engine, rated 500 hp. at 400 rpm. in their 80 ft. tugboat *Scarth*.

THE John Matton Shipbuilding Company of Cohoes, New York has just placed its order for an Enterprise Turbocharged Diesel engine rated 1000 hp. at 280 rpm. for new 88 ft. canal tug which they are building for inland waters.

Wausau Appoints Paul E. Erwin

PAUL E. ERWIN has been appointed Atlanta branch manager for Wausau Motor Parts Co., manufacturers of Oil-Savr piston rings and valve seat inserts.



Paul E. Erwin, Manager
Atlanta Branch of Wausau
Motor Parts Co.

Mr. Erwin was formerly regional director of sales and service for Ford Motor Co., and more recently was in charge of fleet operation and maintenance for a large jobbing organization. He will be a valuable addition to the fast growing and aggressive Wausau organization because of his automotive engineering training and his keen merchandising talents.

Worthington Appoints W. J. Van Vleck Manager of Atlanta District Office

WORTHINGTON Pump and Machinery Corporation has announced the appointment of William J. Van Vleck as Manager of its Atlanta Office, succeeding Edward Stauverman, who, after many years of association with Worthington, has resigned to engage in another line of business.

Mr. Van Vleck entered Worthington's employ in 1924 as a member of the student group. Since 1938 he has been assistant manager of the Philadelphia District Office. Prior to that assignment he was application and field service engineer in the same district.



SAFEGUARD DIESEL ENGINE PERFORMANCE with Dependable ADECO FUEL INJECTION EQUIPMENT



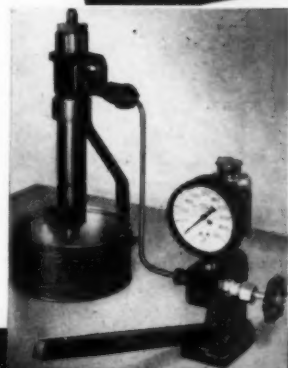
Adeco equipment is engineered to secure the optimum performance of the engine you are building or plan to build. Today's line of fuel injection pumps, nozzles and nozzle holders is the most dependable in Adeco history—the result of years of pioneering and research for the diesel industry. Their performance speaks louder than words in pointing the way to the finest in diesel fuel injection equipment.



ADECO NOZZLE TESTER for LOW-COST MAINTENANCE

America's most widely used Nozzle Tester enables any mechanic to make quick, accurate tests on injector opening pressure, spray pattern, etc., and detect stuck needle valves and leakage around valve seats. Compact, portable, sturdy, precision-built. Pressures up to 10,000 p.s.i. Tests both large and small injectors. Avoids costly delays and possible damage to engine. Also obtainable with Navy-approved gauge. Write for bulletin.

Ideal for Testing Hydraulic Equipment



AIRCRAFT & DIESEL EQUIPMENT CORPORATION

4401 RAVENSWOOD AVENUE, CHICAGO 40, ILLINOIS

Meehanite Holds Annual Meeting

ABOUT 200 representatives of the member foundries of the Meehanite Research Institute of America, Inc., New Rochelle, N. Y., attended the 16th annual meeting which was held at the Hotel Commodore November 1-3. The program included presentation and exchange of research information as developed by member foundries, and the study of service records of wartime applications of Meehanite Castings in India, Australia, Africa, Great Britain and

South America where similar institutes are in existence.

The following officers were elected for 1944: President—Oliver Smalley, Meehanite Metal Corporation, New Rochelle, N. Y.; first vice president—H. B. Hanley, American Laundry Machinery Co., Rochester, N. Y.; second vice president—A. C. Denison, Fulton Foundry & Machine Co., Cleveland, Ohio; secretary-treasurer—C. S. Nichols, Meehanite Metal Corporation, Chattanooga, Tennessee.

Elliott Company Appoints Frank H. Stohr

THE appointment of Frank H. Stohr as assistant to the president of Elliott Company, Jeannette, Pa., is announced by Grant B. Shipley, president, on behalf of the Board of Directors. With Westinghouse Electric & Manufacturing Company since his graduation in electrical engineering from the University of Iowa in 1922, Stohr was made manager of the generator sales section in 1926. Successively, he became sales manager of the generating division, manager of the generating and transportation manufacturing division, and manager of the industry sales department in 1939, which position he held until joining Elliott Company.



Frank H. Stohr

White Star Added to General Controls' Army-Navy "E" Flag

ROBERT P. PATTERSON, Under-Secretary of War, in a congratulatory letter to the men and women of General Controls Co., Glendale, California, announces their winning for the second time this year of the Army-Navy Production Award for "meritorious services on the production front." The "E" flag was first awarded General Controls Co. at impressive ceremonies at their headquarters' plant last March. General Controls' double victory was earned in producing their high line of electromagnetic controls, used on aircraft for de-icing, cabin-heating, propeller-feathering, wing flap and other important flying functions. High controls, being light weight, vibration resistant, and operating in any position regardless of acceleration or change of motion, are also used on locomotives, trucks, tractors, tanks, ships and many other types of mobile equipment.

Color is NO GUIDE

IN DETERMINING THE CLEANLINESS OF DETERGENT OILS!

The many types of additives introduced into oil to prevent the formation of sludge, etc. often cause the oil to take on many hues other than the amber color usually associated with pure mineral oil. So color alone is not a good guide to the condition of detergent oils.

The one sure way to insure cleanliness in detergent oils from the time they are poured into the crankcase until draining time, is employment of the proper type oil filter. This filter must provide adequate depth filtration and properly controlled flow, to permit the removal of the highly diffused engine-wearing contaminants.

DELUX CONTROLLED DEPTH CLEANSING

Now More Important than Ever!

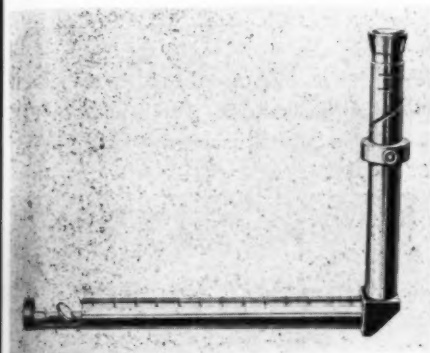
DELUX Oil Filter

DOES MORE THAN STRAIN OIL... MORE THAN FILTER OIL
ACTUALLY CLEANSSES OIL

DELUX PRODUCTS CORP., 1416 Lake Street, La Porte, Indiana

Polan Borescopes for Internal Surface Inspection

ORIGINALLY designed for the internal surface inspection of gun bores, Polan Borescopes are now available for use by private industry. Borescopes have solved the problem of making the surface of long bores accessible to the human eye in order to inspect for minute cracks or other surface faults which may cause failure in operation.



Industrial Type Polan Borescope.

Borescopes are recommended particularly for close scrutiny of internal surfaces of bored engine shafts, tubular bodies, hydraulic and other cylinders, etc., and will cover a diameter range from 13/16 in. to 9 in., and a bore length up to 30 feet.

Polan industries have developed a complete line of these industrial telescopes. The instruments combine the qualities of a highly corrected lens system and of excellent interior illumination with the demand for rugged design which is necessary for every-day machine shop use. The instruments will supply a clear and magnified view of bore surfaces. They do not strain the inspector's eyes when operated continuously, and require no special operator training.

In cooperating with industry, a number of special borescopes and a wide variety of special attachments have been developed. For further information, address Polan Industries, 1577 Sixteenth Street, Huntington, West Virginia.

R. W. Owens Becomes Elliott Vice President

THE election of R. W. Owens as vice president in charge of manufacturing at Elliott Company, Jeannette, Pa., is announced by Grant B. Shipley, president, on behalf of the Board of Directors. Mr. Owens joined Elliott Company as assistant to the president in February, 1944, having previously had a wide experience of some twenty-eight years in the design and manufacture of electrical products.

Professor Marks of Harvard Discusses Present and Future of Gas Turbines

DR. LIONEL S. MARKS, Professor Emeritus of Mechanical Engineering at Harvard University, in a recent lecture at the Battelle Memorial Institute, Columbus, Ohio, discussed gas turbines. Prof. Marks is delivering a series of lectures on this subject in various cities, under the auspices of the American Society of Mechanical Engineers. He said, in part:

"At the beginning of this century the reciprocating steam engine was the only heat engine of any importance. Since then the steam turbine has almost completely replaced it on account of its higher efficiency, compactness, simplicity, large power per unit, low labor and maintenance costs, low first cost, and low oil consumption.

"In the same interval, the internal-combustion engine (including explosion and Diesel types)



EVEN in the toughest going, electric starting, powered by Globe Spinning Power Batteries, is easy, dependable, unfailing — instant starting at a touch of a button. That's why so many

operators depend upon Globe Spinning Power with their exclusive Perma-Set plates. A Globe Engineer will be glad to survey your needs — without obligation. Write nearest factory.

GLOBE-UNION INC., MILWAUKEE 1, WISCONSIN

Atlanta • Boston • Cincinnati • Dallas • Kansas City • Los Angeles
Memphis • Minneapolis • Philadelphia • Seattle



has developed to a high degree of perfection, but so far has used an intermittent process and reciprocating motion.

"There have been two difficulties in the way of the development of the gas turbine. To be efficient a gas turbine must be supplied with compressed air. Up to very recently, the available compressors have had efficiencies so low that it required practically all of the power of the turbine to operate the compressor and little or nothing was left for doing other work.

Now, as a consequence of the development of the axial-flow compressor, which has higher efficiency, this difficulty is removed. The other difficulty has been in finding materials which would stand up under the high temperatures which must exist if good efficiencies are to be obtained. Such material must not only resist corrosion but must have strength enough to support the high centrifugal and other stresses to which the turbine blades are subjected. This difficulty is only overcome in part, so that high efficiencies must still await the development of

new heat resisting metals.

"One of the most interesting possibilities for the gas turbine is in relation to aircraft propulsion. It cannot be used in conjunction with a propeller since its efficiency is only about one-half that of a good airplane engine, but it has notable advantages in any case where 'jet propulsion' is being considered."

Baldwin Appoints C. D. Allen

APPOINTMENT of C. D. Allen as transportation sales engineer for the Pacific Coast District Sales office of the Baldwin Locomotive Works at San Francisco, is announced by F. R. Kohnstamm, district manager.



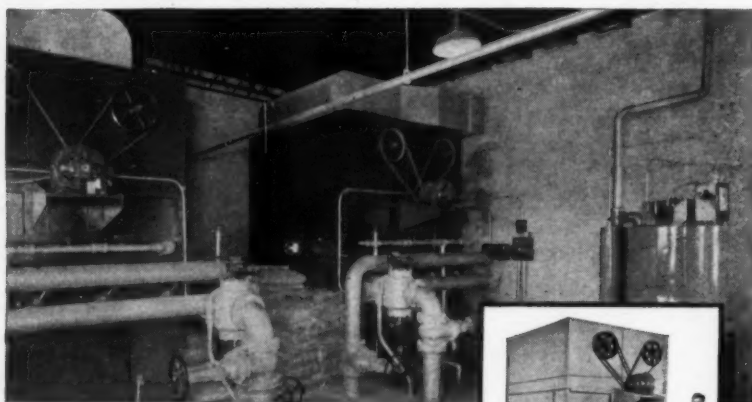
C. D. Allen

Allen had served Baldwin at Philadelphia, having been in charge of inspection and field service for steam and electric locomotives for the past three years. Previously, he had been associated with the Central of Vermont, Canadian Pacific, and Canadian National railroads for 12 years and with Manning, Maxwell & Moore, Inc. and J. S. Coffin Jr. Co., from 1926 to 1941.

The district sales office, located at 2929 19th St., San Francisco, was opened April 1 and directs the sales and service activities of all Baldwin Divisions and the Pelton Water Wheel Co. in the Pacific Coast area.

Lyle E. Hill Returns To Caterpillar

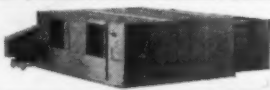
H. W. SMITH, Manager of Engine Sales Department, Caterpillar Tractor Co., Peoria, Illinois, announces the return of Lyle E. Hill as head of the department's Railroad Power Division. For two years, Mr. Hill has served "Caterpillar" as a Priorities Supervisor and spe-



OPERATING COSTS REDUCED WITH EVAPORATIVE COOLING

This installation of two Young Evaporative Coolers in an Iowa Co-op electric plant, efficiently maintains proper engine jacket water temperatures for a battery of Diesel-generating units serving 2700 miles of lines. On a variety of special applications Young Evaporative Coolers have proved they are most economical closed system cooling units to operate when atmospheric temperatures are too high. Designed to cut water consumption to a minimum, they are extensively used to cool engine and compressor jacket water; to maintain temperatures below the ambient dry bulb in chemical processing and for gas cooling. Let Young Heat Transfer Engineering help you to lower operating and maintenance costs.

Young also makes "STREAMAIRE" factory and office Air Conditioning Units which incorporate all the recognized engineering and design features plus Young "Quality". Available in 8 ceiling suspension models (illustrated) and 8 floor models. Capacities range from 400 to 16,625 cfm. Write for Catalog No. 1541.



YOUNG

HEAT TRANSFER ENGINEERS

Manufacturers of Oil Coolers • Gas, Gasoline, Diesel Engine Radiators • Intercoolers • Heat Exchangers • Engine Jacket Water Coolers • Unit Heaters • Convectors • Condensers • Evaporators • Air Conditioning Units • Heating and Cooling Coils • Complete Line of Aircraft Heat Transfer Equipment.

YOUNG RADIATOR COMPANY, Dept. 234-M Racine, Wis., U. S. A.
Distributors: The Happy Co., Tulsa, Oklahoma—A. B. Flournoy, Bell (Los Angeles), California—Wrightson-Campion, New York, N. Y.—W. P. Navins Co., Chicago, Ill.—Colmet Engineering Co., New Orleans, La.
—Export: Ameresco, Inc., New York, N. Y.

BUY BONDS
PRODUCE MORE
SALVAGE SCRAP
WIN THE WAR

cial traveling representative of the Purchasing Department.



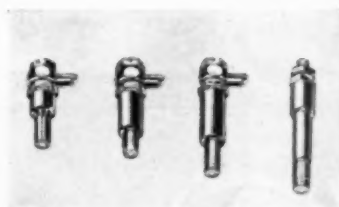
Lyle E. Hill

In the Railroad Power Division, Mr. Hill will contact all U. S. and Canadian railroad companies in furthering the sale of Diesel-electric switching locomotives—in conjunction with the several manufacturers who power their locomotives with "Caterpillar" Diesel engines.

Mr. Hill came to the Engine Sales Department of Caterpillar Tractor Co. in 1941 from the Chicago and Northwestern Railroad Co. with which he had served for more than 19 years. He is a graduate of the Northwestern line's 4-year machinist apprentice training, and as a former motive power official is widely experienced in the application of Diesel Electric railroad motive power.



To left: Ex-Cell-O Nozzle Tip Assembly . . . Pintle, Spring, and Spring Hanger are the only moving parts (Enlarged View).



To left: Ex-Cell-O Aircraft Nozzles . . . These offer the engine designer unusual freedom in arranging valve location, coolant passages, gas passages, etc. Ex-Cell-O Aircraft Nozzles are equally suitable for gasoline or fuel oil injection.

Above: Ex-Cell-O Nozzle Tip and Nozzle Holder—Angle Clamp-Type Assembly. Through engine builders, Ex-Cell-O Nozzles are interchangeable with other type nozzles.

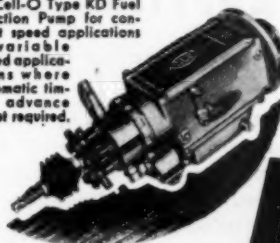
WHERE EXPERIENCE COUNTS

Ex-Cell-O Fuel Injection Nozzle backed by 25 years of precision engineering and production

Consider These Superior Features of the Ex-Cell-O Nozzle:

1. No leakage drain lines are required.
2. All working parts are contained in the nozzle tip assembly.
3. The nozzle tip assembly fits in other makes of nozzle holders.
4. The standard nozzle tip assembly runs a wide range of types and sizes of engines—20 to 300 horsepower, and six different types of combustion chambers.
5. The nozzle holder assembly contains no working parts and serves only as an adapter to hold the nozzle tip assembly in the cylinder head and conduct fuel from the tube to the nozzle tip assembly.
6. There is no long lapped fit on the nozzle valve, which eliminates possibility of valve stickage.
7. All parts of the nozzle valve are inside the tip body between injections, protected from combustion chamber heat and carbon.
8. The nozzle tip assembly is sealed to prevent unauthorized changing of factory settings.
9. A filter is provided to protect the nozzle tip assembly from dirt during shipping, handling, and running.
10. The nozzle tip assembly is suitable for gasoline injection, as well as fuel oil.
11. The light weight of the working parts in the nozzle tip assembly make the tip particularly well suited for high speed engines.
12. The small size of the working parts in the nozzle tip assembly makes possible the manufacture of special small size nozzles for aircraft engines and other applications where small size and light weight are desirable.
13. Clamp-type and screw-type holders are available to meet the requirements of all engines.
14. No special tools are required to disassemble the nozzle holder assembly.
15. No adjustments are required when a new nozzle tip assembly is installed in the field, because all of the necessary settings are made at the factory before the tip assembly is sealed.

Ex-Cell-O Type KD Fuel Injection Pump for constant speed applications or variable speed applications where automatic timing advance is not required.



For further information get in touch with
Fuel Injection Division
EX-CELL-O CORPORATION
DETROIT 6, MICHIGAN

Young Radiator Appoints Texas Representative

YOUNG Radiator Company, designers and manufacturers of heat transfer products for heating, cooling and air conditioning—for the aircraft, automotive, marine and processing industries, announces the appointment of the Rodgers Engineering Company of Dallas as sales and engineering representatives in North-east and North-central Texas.

Rodgers Engineering Company will provide

sales and engineering service on the line of Young heating, cooling and air conditioning products as well as a complete line of complementary accessories. To that end they will co-operate with industrial establishments, jobbers and contractors in laying out complete heating, ventilating and air conditioning systems or extending the facilities of established systems. Every army camp and air field in northern Texas has been served by the engineers from this office since the present military program was undertaken.

The Happy Company of Tulsa, Oklahoma, with branch offices throughout the Texas, Mid-Continent and Illinois oil fields, will continue to distribute Young products for producing, refining and pipe line application.

Magrath Heads DeBothezat's Chicago District Sales

JOSEPH G. MAGRATH has been appointed manager of its Chicago district sales territory according to an announcement issued by American Machine and Metals, Inc.



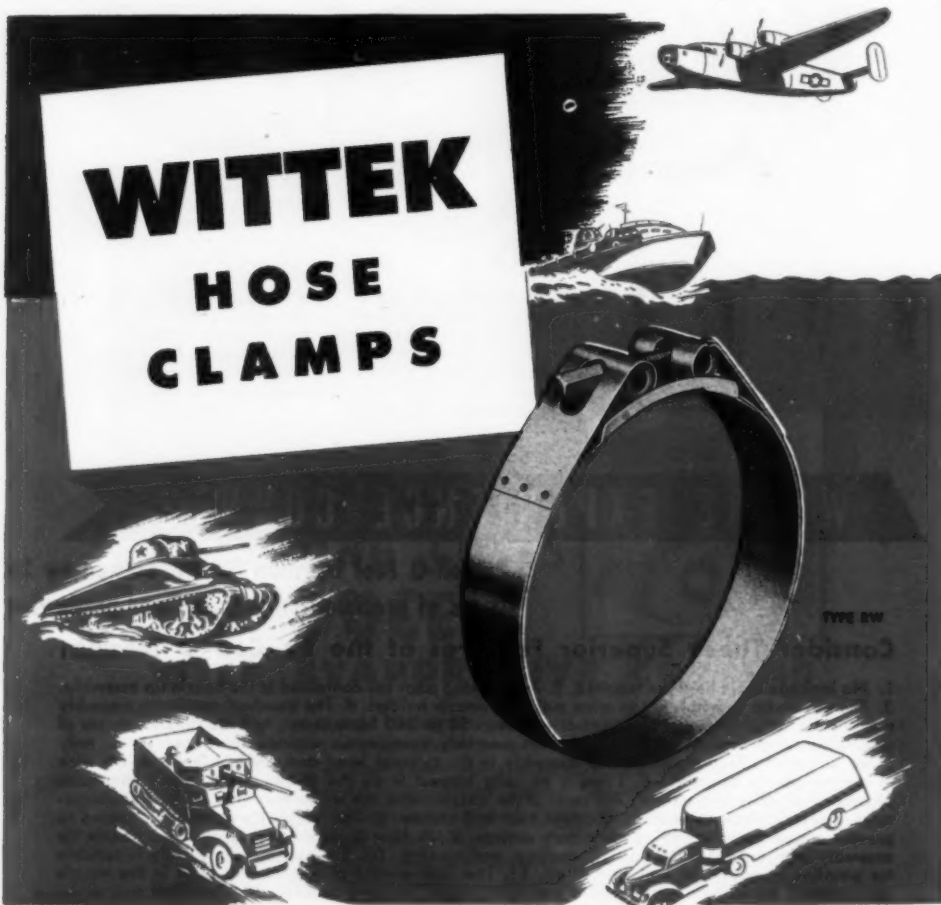
Joseph G. Magrath

Mr. Magrath is a graduate of mechanical engineering at Drexel Institute of Technology and has been associated with various wood product manufacturers and more recently as sales engineer and merchandising manager for Air Reduction Sales Company of New York. He is a member of the Society of American Military Engineers, American Society for Metals and American Welding Society. Headquarters of the new Chicago district office of American Machine and Metals, Inc., of which Mr. Magrath is manager, are now located at 310 South Michigan Avenue in that city. The divisions of the company under his supervision include Troy Laundry Machinery, DeBothezat Fans, Tolhurst Centrifugals, and Riehle Testing Machines.

New Flow Splitting Device

A NEW flow splitter, called the Micro-Rota-weir, is available to accurately divide a liquid flow into two streams. The proportions of the flow division may be varied at will by adjusting an outside lever and pointer to the percentage desired, as indicated by an external scale.

The Micro-weir may be obtained with fittings in all metals. The shell may be either metal or Pyrex glass. For high melting fluids the



FOR DIESEL APPLICATIONS Strong—Dependable—Easily Installed

The dependability of Wittek Hose Clamps, long accepted by the automotive and aviation industries, is now being proven by actual service with the armed forces of the United Nations as standard equipment for aircraft, tanks, jeeps, trucks, ships and other combat vehicles. Wittek Hose Clamps are made in many different sizes and types for Diesel applications: Type RW for hose connections of 5" in diameter and larger; Type RM for 3½" to 5"; Type RN for 2½" to 3½" and Type FBC for 2½" hose connections and smaller. Write for new descriptive catalog. Wittek Manufacturing Co., 4305-15 West 24th Place, Chicago 23, Illinois.

WITTEK *HOSE CLAMPS*
Dependable Hose Connections



metal shell may be lagged and steam-heating coils placed inside the Rotaweir.

The Micro-Rotaweir will handle flows from 30 gph. to 900 gph. Sizes up to 15,000 gph. are also contemplated.

The Micro-Rotaweir has been used for the following operations:

- a) Proportioning product to reflux on small pilot plant stills.
- b) Dividing liquid flow to twin absorbing units, cooling towers or other reactance vessels operating in parallel.
- c) Flow splitting for liquid blending and flows to storage tanks.

For complete information write to Fischer & Porter Company, 941 County Line Road, Hatfield, Pennsylvania.

Professional 10" Slide Rule

Exceptional value in a polyphase type rule. B, C, D, CI and K scales are on front and L, T, scales are on the back of the slide. Access at end has a contact hairline index permitting use of S, L, and T scales without removing slide.



Markings are clear, easy to read, accurately and finely calibrated on white face. CI calibrations are in red. Sharp hairline indicator is aluminum framed.

Rule made of carefully machined hardwood and has smoothly finished edges. Retains accuracy regardless of temperature or humidity. Attractive flexible case and instructions with every rule. Write Lawrence Engineering Service, 504 North Smith Street, Peru, Indiana, for all particulars.

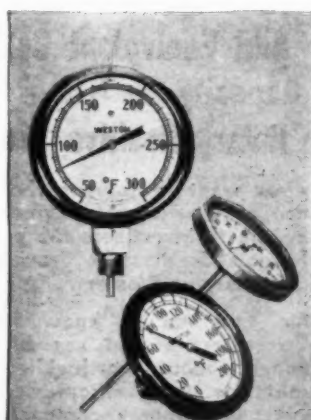
Arch A. Warner Elected President of Rockford Drilling Machine Division

THE election of Arch A. Warner as president and general manager of Borg-Warner's Rockford Drilling Machine Division, Rockford, Ill., was recently announced. Mr. Warner succeeds C. Traner, who after more than 25 years with the company is retiring from active direction of all its operations to become chairman of the supervisory board. The new president formerly was works manager of Mechanics Union Local Joint, also a Borg-Warner division at Rockford.

MOST Readable



Where READABILITY COUNTS MOST



WESTON All-Metal Temperature Gauges

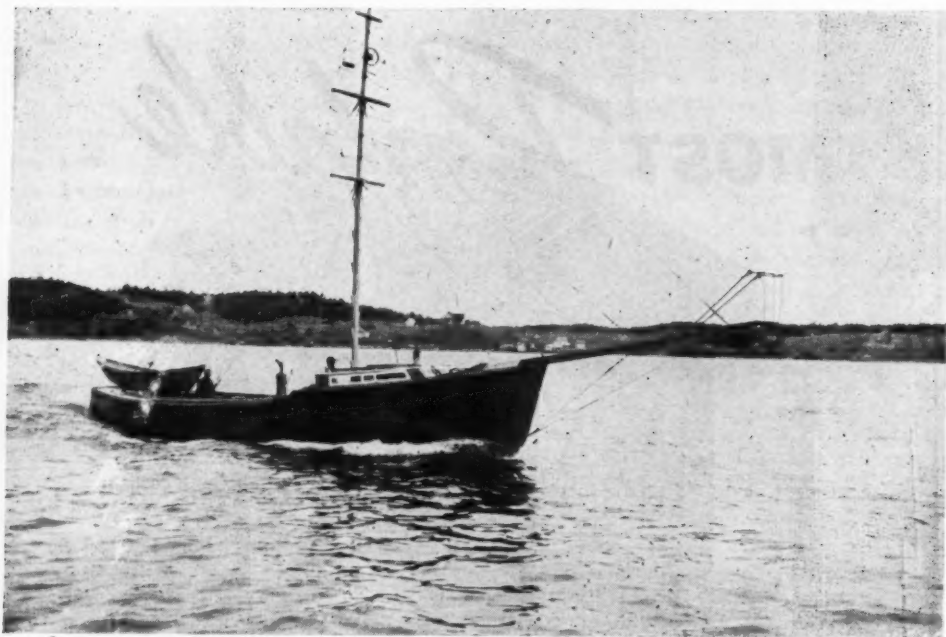
are available in sizes and types for most industrial needs . . . as well as in laboratory models with full scale accuracy within 1/2 of 1%.

Wherever temperatures are critical WESTON thermometers are preferred because of their large, boldly marked dial-type scales. Even though mounted high above eye level, or on equipment in poorly illuminated areas, the scale is visible, and *readable*, without inconvenience. Thus readings are made in less time . . . and with *far greater accuracy* . . . and without the temptation to carelessness that low visibility invites.

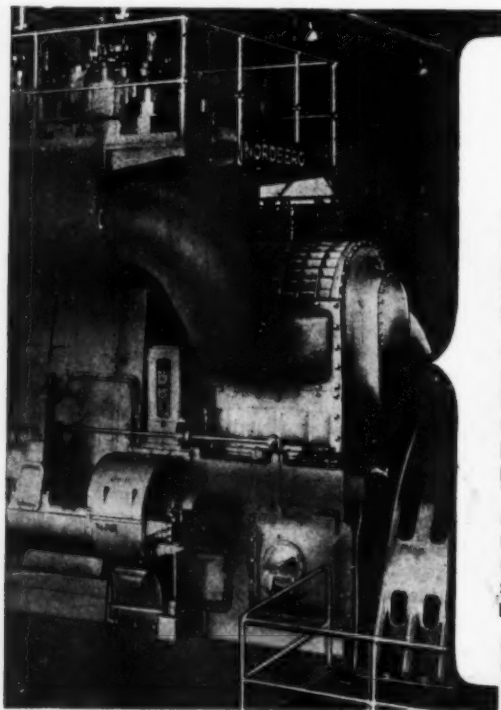
The wide-spread adoption of WESTON thermometers throughout the synthetic rubber, oil refining, and other process industries has been due to this readability, *plus* the records for *long-time dependability* which these simple all-metal thermometers have established. Literature giving complete specifications on all models gladly furnished on request. Weston Electrical Instrument Corporation, 682 Frelinghuysen Ave., Newark 5, N. J.

WESTON

Swords for the Home Front



Edward Levy of Louisburg, Nova Scotia, Canada, will testify that the knights of old had no priority on swords. His sword fishing boat "Castaway" is one of several hundred fishing out of Cape Breton during the sword fishing season which covers a period of about six weeks each year. Their catch is valued as food. "Castaway" is powered by a "Caterpillar" Diesel Marine Engine. Length overall 50'; beam 14'8"; draft 6'. The boat is steered from the main mast platform which also serves as a lookout post.



Add Equivalent Cylinder Capacity by Using "R-C" Rotary Positive Blowers

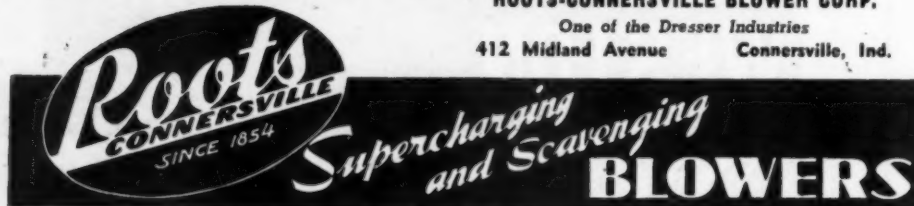
If you want to improve the performance of your Diesel engines—it will pay you to investigate the possibilities of Roots-Connorsville Scavenging and Supercharging Blowers.

Our experience, "know how" and performance-proved products have brought about worthwhile improvements for others. From the combined points of economy, compactness, simplicity, and efficiency, the addition of "R-C" Blowers to your Diesels may also prove to be a most effective means of providing needed improvements in engine performance. We are specialists in such problems. Write us today.

Photo shows "R-C" Scavenging Blower operating at 800 r.p.m., delivering 14,000 c.f.m., against 2 3/4 lbs. pressure.

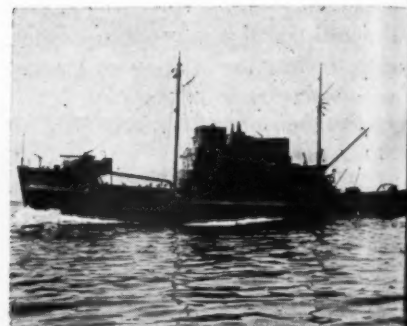
ROOTS-CONNORSVILLE BLOWER CORP.

One of the Dresser Industries
412 Midland Avenue Connorsville, Ind.



Chief Engineer of H.M.S.V. "Boston Salvor" Enthusiastic About American-Made Diesels

"THE main Diesels and electric motors have worked wonderfully, never giving us the slightest anxiety," Donald McBain, chief engineer H.M.S.V. *Boston Salvor* reported to Fleet Mayes, service engineer for The Cooper-Bessemer Corporation.



"Lincoln Salvor," one of the 187 foot ships of the "Boston Salvor," equipped with four Cooper-Bessemer 6-cylinder Diesels driving 300 kw. main propulsion generators.

The chief engineer's congratulations, sent to Southampton, England, after the Atlantic crossing, expressed appreciation for both the good job of Barbour Boat Works of New Bern, N.C. in building the vessel and the performance of her Cooper-Bessemer Diesel engines. Last reports were that the *Boston Salvor* was in active service as one of the BARS, which are similar to our vessels in the ARS class.

When complete figures can be released, it is believed they will show that Britain's BARS and America's ARS have salvaged millions of tons of shipping valued at billions of dollars. The vessels are completely equipped for salvage work and because of the nature of operation Diesel prime movers are ideally suited for main and auxiliary engines of these salvage ships.

All main engines in the following salvage vessel program were supplied by Cooper-Bessemer. This includes 30 steel vessels, each 211 feet long, with 4 main propulsion generators rated at 610 kw. each and driven by a Cooper-Bessemer supercharged Diesel. The 4 electric propulsion motors are rated at 765 horsepower each, the total rated shaft horsepower per vessel being 3000. There are two ship's service generators, each rated 220 kw. and driven by Cooper-Bessemer Diesel. All steel vessels were built by the shipbuilding division of Barrow Rock Co. Two of the steel vessels were British and the rest ARS (American).

The wooden salvage vessels are 187 feet

V. Elastic Diesels

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Cooper-Be

Each of the wooden ARS and BARS has 4 main
propulsion generators rated at 300 kw. each,
driven by a Cooper-Bessemer Diesel. There
are two electric propulsion motors, each rated
at 600 horsepower, giving a total rated shaft
horsepower per vessel of 1,200.

**MicHELL Named Assistant
Chief Engineer of Mack**
APPOINTMENT of William P. MicHELL as
assistant chief engineer of Mack Trucks, Inc.,
has been announced by L. C. Josephs, Mack
vice president and chief engineer. Mr. MicHELL
recently returned from Great Britain where he
had been serving in an advisory capacity on
military truck transport at the invitation of the
British government.

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187 feet h

WESEL PROO

Bellingham Marine Ways built two each for
Great Britain and United States; American Car
& Foundry, two for United States; and Barbour
Boat Works, two for the British, including the
Boston Salvor.

Each of the wooden ARS and BARS has 4 main
propulsion generators rated at 300 kw. each,
driven by a Cooper-Bessemer Diesel. There
are two electric propulsion motors, each rated
at 600 horsepower, giving a total rated shaft
horsepower per vessel of 1,200.

MicHELL Named Assistant Chief Engineer of Mack

APPOINTMENT of William P. MicHELL as
assistant chief engineer of Mack Trucks, Inc.,
has been announced by L. C. Josephs, Mack
vice president and chief engineer. Mr. MicHELL
recently returned from Great Britain where he
had been serving in an advisory capacity on
military truck transport at the invitation of the
British government.



William P. MicHELL

Mr. MicHELL began his engineering career with
the Whitlock Company in Hartford, Conn.,
before going overseas as a first lieutenant in
World War I. After the war he returned to
Whitlock, eventually going with Ace Motor
Corp. as shop superintendent. He joined Mack
in 1923 as a shop engineer and through a series
of promotions became assistant to the chief
engineer in 1937.

A graduate of the University of Pennsylvania,
Mr. MicHELL is chairman of the Motor Truck
and Motor Coach Division Standards Commit-
tee of the Society of Automotive Engineers. He
is a member of the American Society for Test-
ing Materials, the Army Ordnance Association
and a Professional Engineer of the State of
Pennsylvania.



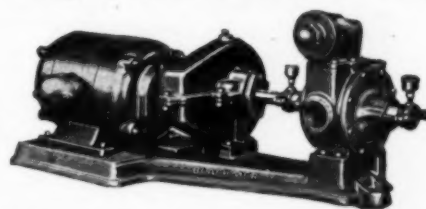
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Bulletins, Catalogs and
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BLACKMER ROTARY PUMPS

and the "Bucket Design" (swinging
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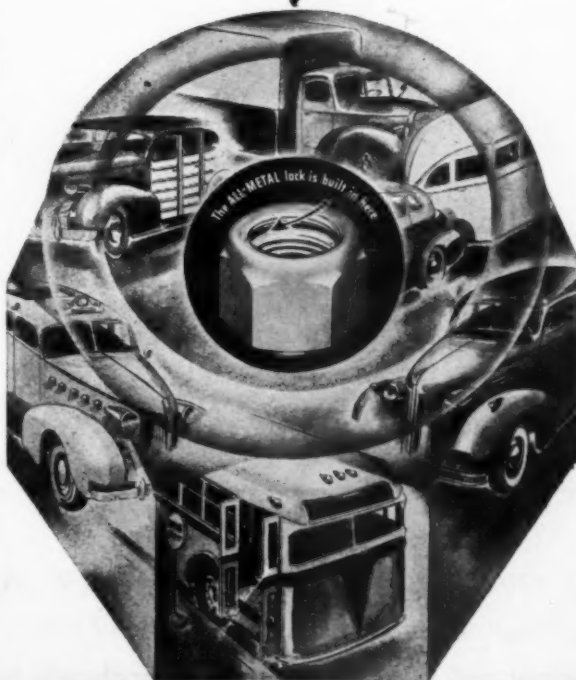
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POWER PUMPS - HAND PUMPS - EZY-KLEEN STRAINERS -

99% Say "THESE ARE THE NUTS!"



*Operators of 110,000 vehicles indicated in this survey that if a vibration-proof nut like
the above were standard on their post-war equipment, tens of thousands of dollars
for maintenance and repairs would be saved.

Motion Picture—"All Work And No Play"—16
mm. sound—30 minutes. Write for information.

Representatives in New York • Chicago • Detroit • Indianapolis • Los Angeles • Kansas City • Dallas • Toronto • Montreal • Vancouver

"These nuts will be like a gift from
heaven!" said a Kansas City fleet owner
in a recent survey.*

Ninety-nine out of every hundred
who replied said "YES!" when asked if
the Boots All-Metal Self-Locking Nut
would improve their post-war equipment.

More than 1000 fleet supervisors an-
swered this survey. They named over
60 danger spots where loose nuts cause
frequent costly breakdowns.

On the worst spots, the Boots Nut
has been tested on many trucks. Eight-
teen months of hard-driving wear-and-
tear couldn't shake this all-metal one-
piece nut loose from a single connection!
Secured by its built-in lock, the Boots
Nut is unaffected by heat, gasoline,
chemicals. Easily removed with an ordi-
nary wrench. Can be used again and
again; no accelerated locking loss.

Your first new models can feature
Boots security . . . without a change in
automotive design.

BOOTS

SELF-LOCKING NUTS

"There's No Room for a Nut Shaking Loose"

Boots Aircraft Nut Corp. • General
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VOLUME NINE

M

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described--profusely illustrated

\$5.00

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Alco Stationary Diesels

Alco Sulzer Diesels

Anderson Model KD

Atlas Imperial Stationary Diesels

Atlas Imperial Industrial Diesels

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Cooper-Bessemer Types GN and EN

Cooper-Bessemer Type JS

Cooper-Bessemer Type LS

Cummins Model A Diesel

Cummins Model H and HS

Cummins Model L

Cummins Fuel Injection System

Dodge Lanova Diesel

Enterprise Standard & Supercharged Diesels

Fairbanks-Morse Model 38 "OP" Diesel

Fairbanks-Morse 4-cycle Types 33 and 37

Fairbanks-Morse 4-cycle Model 32

Fairbanks-Morse 4-cycle Model 35

Fairbanks-Morse 4-cycle Model 36

Fairbanks-Morse 4-cycle Model 32

General Iron Works Co. Models RR, BG and KS

General Motors Model 71

General Motors Model 567

Gray Marine Diesels

Harbison-Rohr Diesels

Harrison Double Acting Diesels

Harrison Single Acting Diesels

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Hercules Automotive Diesels

Hill Model R Diesels

Ingersoll-Rand Type "S"

International Tractor and Industrial Types

Kahlenberg Marine and Stationary Diesels

Kermath 4-cycle Marine Conversions

Lathrop Types D-50 and D-80

Lister-Blackstone Models CD and CE

Lorimer Slow Speed Heavy Duty Diesels

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Murphy ME Series Diesels

Nordberg Convertible Diesel-Gas Engines

Nordberg 2-cycle Diesels

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Rathbun-Jones Diesel and Gas Engines

John Reiner Diesel Marine Auxillary Units

Sheppard Models 6 and 7

Superior (National Supply Co.) Models A and D

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Waukesha Multi-fuel Oil Engines

Witte Diesels and Diesel Electric Plants

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Worthington 4-cycle Diesels

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Adeco Fuel Injection Equipment

American Bosch Fuel Injection Equipment

Demco Fuel Injection Equipment

Dendix Santilla Fuel Injection Equipment

Ex-Cell-O Fuel Injection Equipment

American Blower Hydraulic Couplings

Durabla Pump Valve Service

Diamond Chain Drives

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VOLUME 9

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DIESEL ENGINES, INC.—Two West Forty-Fifth Street—New York 19, N. Y.

Enter my order today for a copy of the New Diesel Engine Catalog, Volume Nine, Edited by Rex W. Wadman, for which I enclose \$5.00.

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NOW

The SENSIBLE way to **CONQUER SLUDGE**

and control the cause of
many engine troubles—
**WITHOUT HARM
TO ENGINES**

To *retard* the formation of combustion residues (carbon) and to *remove* gummy deposits, carbon binders and sludge—just add POW-R-FLO to the lubricating oil, regularly, as prescribed by our Engineering Service.

The experiences of many operators of Diesel engines, in different fields, has *proved* that this is the most effective method of reducing accumulations of sludge and keeping it in suspension in the oil for easy removal by the filters—for maintaining **CLEAN, EFFICIENT, FREE-RUNNING** engines and lengthening the periods between overhauling jobs.



This highly efficient internal engine lubricant is a pure, treated mineral oil, free of all impurities and residues. It **INCREASES** the film strength of the oil to which it is added, minimizes film friction—even with heavy oils. It is **HEAT-RESISTING** and has **HIGH CAPILLARY** action.

HARMLESS to any internal combustion motor—no matter how much is used. Yet it has an effective dissolving action on gummy deposits.

FREE DEMONSTRATION

Without cost or obligation, we will run tests of POW-R-FLO Prescribed Lubrication on one of your Diesel engines in use—and let **YOU** be the judge of *its SAVINGS* in operating and upkeep costs.

Write for full information

The MAUSTON CORPORATION
WINONA, MINNESOTA

Information On Diesel Cooling Water Treatment

FOR operators of internal combustion engines (Diesel or gas) and compressors who are concerned over the effect of scale and corrosion in engine jacket cooling systems on plant operation and maintenance, valuable information on how these problems are being controlled is contained in two articles appearing in the September issue of the H-O-H Lighthouse, house organ of the D. W. Haering & Co., Inc. The results of tests by one of the nation's major railroads is covered by one article on Diesel Engine Cooling Water Treatment. The second is a very informative article on "Scale and Corrosion Control in Engine Jacket Cooling Systems" and should be in the library of every operator of water cooled equipment. Write D. W. Haering & Co., Inc., 205 West Wacker Drive, Chicago 6, Illinois, for your copy.

Aircraft Accessories Elects W. T. Grant

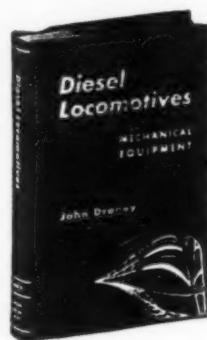
WILLIAM T. GRANT, president of the Business Men's Assurance Company of Kansas City, Missouri has been elected a director of Aircraft Accessories Corporation, according to an announcement made today by Randolph C. Walker, president of the company. Mr. Grant is nationally prominent in business and insurance circles. In addition to heading the Business Men's Assurance Company, he is, also, president of the National Security Life Insurance Company, Kansas City; Power & Light Company, and the Metropolitan Savings & Loan Association.

Drayer & Hanson Announce Organizational Changes

ANNOUNCEMENT of four important organizational appointments in connection with post-war expansion plans, is made by R. E. Ristow, President of Drayer & Hanson, Inc. Albert Hanson has been promoted to the position of Vice-President in charge of engineering. J. C. Lombardi, who has been in special sales capacities for a number of years, has been appointed as Vice-president, Director of Sales. Scott M. Hauser, Vice-president, becomes Director of Sales Promotion and Advertising. A. H. Witt, who has also been in special sales work for the corporation during the war period, has been promoted to the position of Air Conditioning and Refrigeration Sales Manager.

These appointments are made as the result of plans for substantially increased activities in heat exchange fields. Known as the first and only factory of its kind in the West, Drayer & Hanson, Inc. has complete facilities for the

**RAILWAY
LOCOMOTIVE
ENGINEER
ADVISES
DIESEL**



Just Published

The First Books of their Kind.

A practical guide to the operation
and maintenance of

RAILWAY DIESEL LOCOMOTIVES

By **JOHN DRANEY**,

Past President, United Association of
Railroad Veterans

In collaboration with Diesel technicians from
American Locomotive Co.; Baldwin Locomotive
Works; Electro-Motive Division of General
Motors Corp.; General Electric Co.; Westinghouse
Electric & Mfg. Co.; and many others.

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Characteristics of Engine Cycles—Combustion Principles in Modern Diesels—Combustion in High-Speed Diesels—Fuel-Injection Nozzles—Fuel-Injection Pumps—Lubrication and Cooling Systems—Governors—Supercharging and Turbo-Charging—Air Filtration—Caterpillar Diesel—Cummins Diesel—Hercules Diesel—Cooper-Bessmer Diesel—American Locomotive (McIntosh & Seymour)—Baldwin Locomotive Diesel (De la Vergne)—General Motors Diesel-Electro-Motive Division—Fairbanks Morse High-Speed Diesel—Description and Operation of Mechanical Equipment—Maintenance Instructions—Trucks—Auxiliary Equipment—Vapor-Clarkson Steam Generating Units.

472 pages, 220 illustrations, \$4.00

ELECTRICAL EQUIPMENT

Current Electricity—Principles of a Generator—Ohm's Law—Electrical Power Measurements—Transmission Equipment—GE Light Weight Diesel Locomotive—EW Equipment for Switching Locomotives—Electro-Motive Equipment—Alco-Ge 660 HP. and 1000 HP. Diesel-Electric Locomotives—Alco G-E Diesel-Electric Road Locomotive 2000 Hp. Equipment.

388 pages, 235 illustrations, \$3.75

Both \$7.50 postpaid

Order from

DIESEL PROGRESS

2 West 45th St. New York 19, N. Y.

engineering, designing and manufacturing or heat exchange equipment for all types of industries. In addition, it markets a complete line of heat exchange equipment, including Wat-R-Miser evaporative coolers, Spasaver horizontal air coolers, Strata-Flo water coolers, Flocold cooling units, and has recently put on the market two new types of airplane exhaust heaters under the brand name Hexheat.

24" Interlocking Hose a New Penflex Product

PENNSYLVANIA Flexible Metallic Tubing Company announce an asbestos packed interlocked galvanized steel hose with an inside diameter of 24". It is the largest hose of its kind in the world. It weighs approximately 70 lbs. per foot and is manufactured for use on Marine and stationary Diesels as flexible exhaust pipes. Because of its interlocked construction it requires no special tools or heat to bend. This new product has applications outside the Marine and stationary Diesel field, as for instance, flexible connections for storage tanks in the refining industry.

A. M. Buxton Appointed Assistant Sales Manager for Cooper-Bessemer Corporation

A. M. BUXTON has been promoted to assistant sales manager of The Cooper-Bessemer Corporation, it is announced by S. E. Johnson, general sales manager.

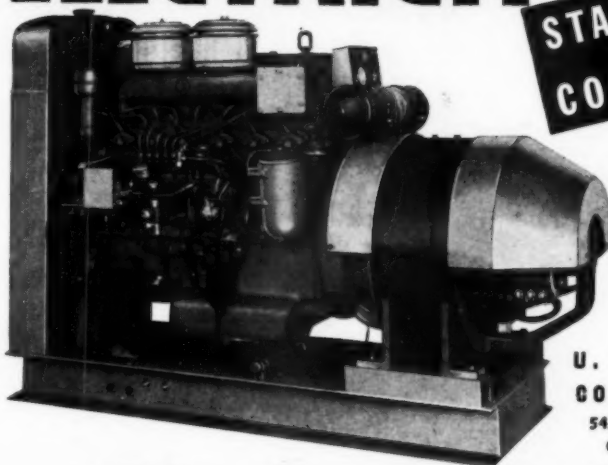


A. M. Buxton

In addition to sharing responsibilities of the general sales manager, Mr. Buxton will direct the company's oil and gas field sales, according to Mr. Johnson, since he has been working closely with these fields in his former position at the company's Tulsa office. Mr. Buxton has been with Cooper-Bessemer for 20 years. He is 43, married and has one child. He has moved his residence from Tulsa to Mount Vernon.

ELECTRICITY

for
STAND-BY SERVICE
OR
CONTINUOUS DUTY



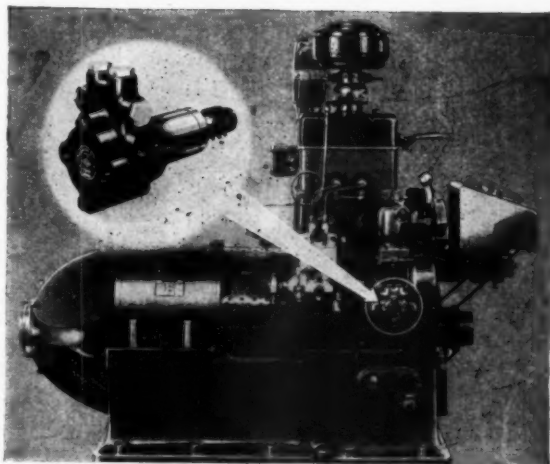
Complete range of units from 3 to 75 KW for all types of service. Where production does not interfere with Army-Navy requirements, U. S. Plants are now available on AA3 priority or better. Write.

U. S. MOTORS
CORPORATION
542 Nebraska Street
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U.S. DIESEL ELECTRIC PLANTS

"SPECIFY EDCO ROTARY PUMPS"



EDCO

ENGINE DRIVEN
FUEL TRANSFER
PUMPS.

Noiseless in operation • Economical to operate and maintain • Pumping action equally effective at all operating speeds, be-

cause of unique and positive method of positioning rotor vanes to maintain effective seal. Capacities up to 15 gal. per min.

Engineering services and descriptive literature on request.

EDDINGTON METAL SPECIALTY COMPANY

Eddington Pa., U.S.A.

They're Going Overboard For Victory—Are YOU?

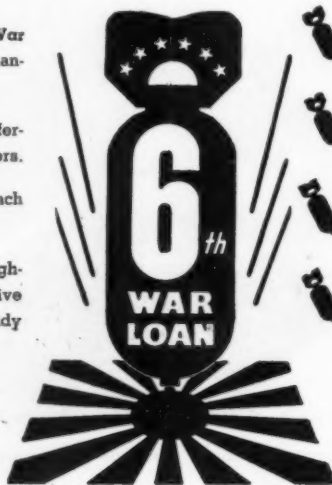


USE 8-POINT PLAN FOR AN OVERBOARD DRIVE IN THE 6th WAR LOAN!

NOV. 20th TO DEC. 16th

Our fighting men still have a long way to go! But—your plant-wide selling of the 6th can do much to shorten their embattled miles—lessen the price they so willingly pay for victory! Join the coast to coast parade of patriotic firms that are assuring an "overboard" showing in the 6th by following through on every point in the 8-Point Plan.

- 1 Start the ball rolling by appointing a 6th War Loan Bond Committee, representing labor, management and other groups.
- 2 Carry on by selecting a Team Captain—preferably a returned veteran—for every 10 workers.
- 3 Right at the start, establish a Quota for each department—and every employee.
- 4 Arrange frequent Meetings of Captains, highlighting importance of their work—effective sales methods—and need for painstaking study of Treasury Booklet, Getting The Order.



Make definite Assignments to those best equipped to arrange music, speeches, rallies, competitive progress boards and meeting schedules.

Issue Individual Pledge Cards—made out in the name of each worker and providing for both cash and installment purchase.

Resolicit! This is the secret of "overboard" War Bond subscriptions. Your State Payroll Chairman has a special Resolicitation Plan for you to put into action near the end of the campaign.

Give generously of your Advertising Space to drive home the War Bond story.

The Treasury Department acknowledges with appreciation the publication of this message by

R. J. T. Tamm
Editor—DIESEL PROGRESS

★ This is an official U. S. Treasury advertisement—prepared under auspices of Treasury Department and War Advertising Council ★

DEMA Holds Second Regional Meeting

AN entirely frank exchange of opinion between Diesel engine manufacturers and engineering school instructors marked their conference at Raleigh, N. C. on October 20. It was the second in a series of five regional meetings between the educational committee of Diesel Engine Manufacturers Association, and deans and professors of colleges and universities. The eastern meeting, expected to top previous attendance figures, is being held November 18 in New York City.

At the Raleigh session, held primarily to discuss means of obtaining Diesel engines for the schools from wartime surpluses, instructors told how manufacturers could be more helpful to them. The manufacturers, in turn, described the type of engineer they wanted the schools to produce.



Left to right: George Mueller, General Machinery Corporation; John W. Anderson, American Locomotive Co.; Henry J. Barbour, Fairbanks, Morse & Co., chairman of the Raleigh meeting; Harold D. Ellis, DEMA, and Prof. Robert B. Rice, educational consultant for DEMA.

New Hydro Borer

A MOST versatile machine, the Hydro Borer, proven in war production and engine maintenance, has begun to cut a niche for itself in other fields as well. Recent experiments by the Hydro Borer Division of Air Parts, Inc., have shown the Hydro Borer to be a find in the repair of even the largest of the automotive, marine and railway engines. The finish bore on all equipment of even this size can be controlled within .0001 of an inch.

Walter B. Hawkins, President of Air Parts, Inc., has this to say: "The Hydro Borer produces a finish bored surface surpassing diamond boring. The patented hydraulic feed has absolutely no end play. In fact, if forward movement of the spindle is impeded, a hydraulic pressure of over 500 lbs. per square inch is generated at once."

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on a Diesel engine**

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Gear Type **Forged Steel**

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Duplex Truck Co.
Lansing, Michigan

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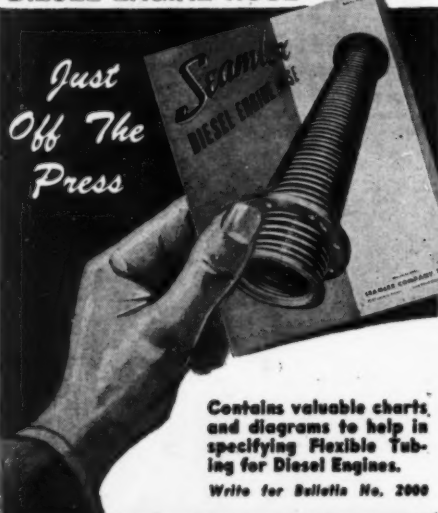
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View of the New Hydro Borer.

These recent practical experiments have become of great interest to the heavy Diesel equipment men as well as operators of truck fleets and railway concerns and other organizations interested in high caliber boring in the maintenance of all types of machines.

Charles E. Rigg, General Sales Manager of the Hydro Borer Division of Air Parts, Inc., in his promotional activities has discovered even more uses of the Hydro Borer. Mr. Rigg has had a great deal of experience in the development of industrial equipment and has found that work under even the closest tolerances can be performed by the Hydro Borer with unbelievable precision by anyone who can read a micrometer.

Air Parts now makes available to maintenance divisions of all types of engine reconditioning and to machine shops concerned with the latest developments in tooling, Models A2, A3 and C2. Basis of sale: direct from the manufacturers. Catalog and complete specifications on your request to Air Parts, Inc., Glendale, California.

DEMA To Hold Business Meeting

A ROUND table discussion of problems facing the industry is the pattern around which the annual meeting of Diesel Engine Manufacturers Association will be built. The meeting is to be held December 6 in Cleveland, Ohio.

It will be strictly a business session, according to Robert E. Friend, president of the association and head of Nordberg Mfg. Co., Milwaukee. The Diesel engine makers will air the issues that confront them now and which will arise at the end of the war.

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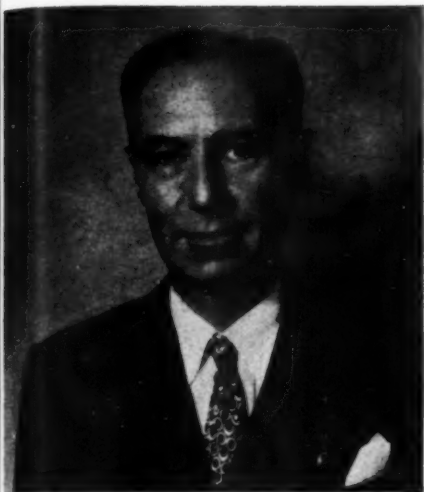
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Robert E. Friend, President, Nordberg Mfg. Co. and DEMA.

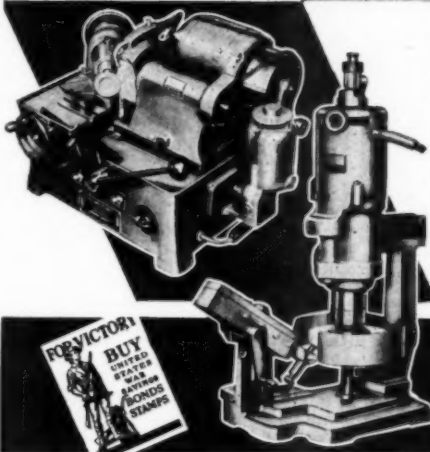
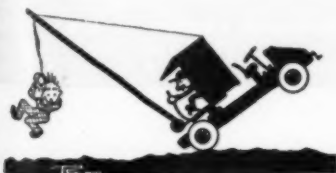
A new activity of the association—that of watching state legislation that may affect Diesel engine interests—will be discussed by Harvey T. Hill, DEMA's executive director. Committees on public relations, traffic, insurance and education will report their progress. At a dinner in the evening the association will elect nine directors to serve through 1945, Mr. Friend said. The directors in turn will elect officers and set up DEMA's program for next year.

Aircraft Accessories Advances William Cooke



William Cooke

WILLIAM COOKE, long associated with Aircraft Accessories Corporation as Director of Industrial Relations, has been named Vice President in Charge of Production of the company's Power Controls Division located at Burbank, California.



Diesel engines today are being asked to give more than they've got . . . Top speeds, maximum loads, minimum fuel consumption, longer periods between overhauls—all these are tough on any engine.

. . . and especially tough where valves and valve seats haven't been ground for each other . . . That's when you need HALL-ground valves and valve seats . . . Precision and finish so fine that after stretch upon stretch of gruelling performance diesels seem to actually have the guts they had when brand new . . . If you want your diesels to have more guts longer between needed valve servings, get HALL Valve Servicing Equipment . . . Write today for complete information.

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—for guaranteed reliability, fuel economy

WRITE FOR BULLETINS

Separate bulletins, available for each Climax Diesel engine, contain specifications, performance curves, dimensional drawings, accessory equipment and complete description. For complete information write Climax Engineering Co., 1822 South Fourth Street, Clinton, Iowa.



"For High Achievement in the Production of War Material"



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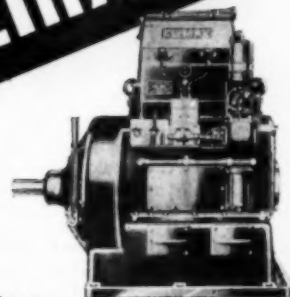
GENERAL OFFICES & FACTORY

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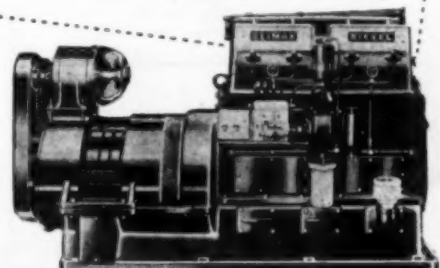
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The Climax Model D 148 two cylinder 22 hp. Diesel engine.



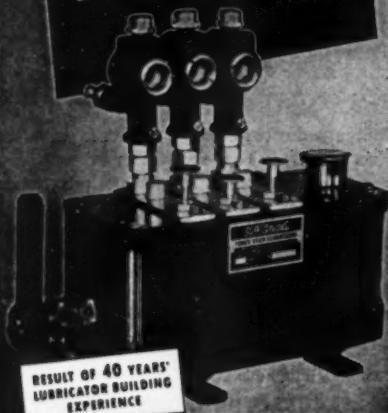
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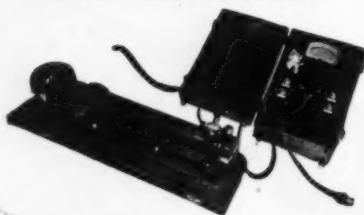


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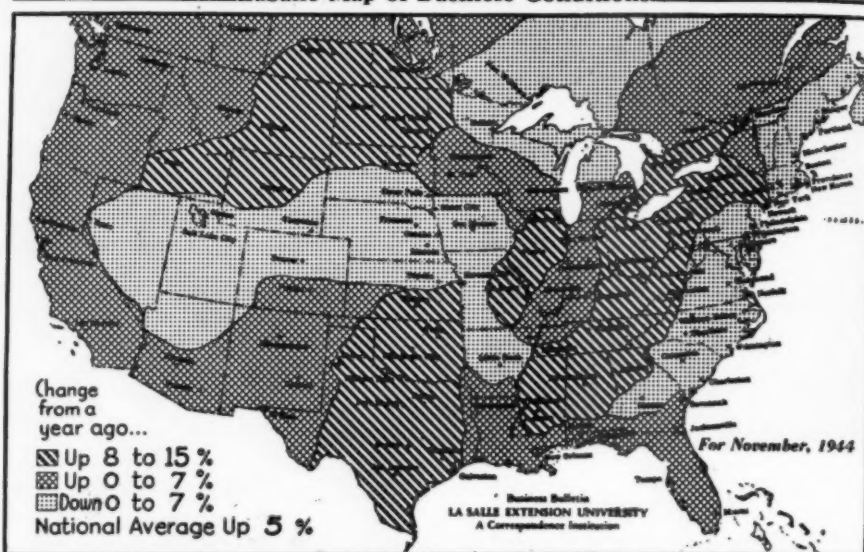
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Application for Membership in the
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LaSalle Map of Business Conditions



Business Volume Is 5 Per Cent Higher Than Last Year

Map Supplied by BUSINESS BULLETIN DIVISION of La Salle

The total volume of business transactions, which includes sales, production, and financing, remains quite a little above last year. The spread between the two years is gradually becoming narrower and before long will probably be wiped out. Very likely the peak in total business activity has been passed in recent months just as the peak in industrial production was reached almost a year ago.

Although business volume is not rising as it had previously been for more than four years, it is holding quite steady very close to the highest levels. Quite as significant as the trends in the general average are variations among different industries and in different sections of the country. These variations can be expected to increase and become even more prominent as the shift is gradually made back to peacetime production.

The most striking changes in the LaSalle Map this month are those along both coasts and, to a lesser extent, along the Gulf. For several years business in these regions has usually been increasing at a somewhat faster rate than the national average. Now they are changing about the same as that average and along the Atlantic coast have been lagging slightly behind. These changes do not mean any marked reduction but reflect more definitely the very high rates of business activity in those places a year ago.

In the New England states, both trade and production have been falling-off, even though activity is still high in most of the seaport cities. Large shipments of goods and military supplies abroad account for much of this activity. In some of the inland cities business is several per cents below last year and some further readjustments may be required. The slowing down in the textile industry, as well as in several closely related lines, is partly responsible for this lowered rate of activity.

Business activity in and around New York City is the major exception to the general hesitancy

along the coast. In that region the volume of business is considerably above the national average and indications point toward continued high rates. Vast quantities of goods are going through the port and the handling of these stimulates activity in many lines.

In most of the industrial regions around the Great Lakes business is operating at high speed and considerably above last year. These conditions prevail on the Canadian side as well as to the south. Greatest gains over a year ago are reported in Chicago, Detroit, and Cleveland areas. In territory around the steel mills, business is about the same as it was last year.

In the agricultural regions of the Middle West conditions have been somewhat spotty. Crops are excellent and in many places close to the largest ever produced. Farm prices have held up fairly well, although those of several important crops have declined. Uncertainty as to future price trends has been a disturbing influence and it is likely to be an adverse factor in the future. Farm income is holding steady at about the peak and is quite a little higher than in recent months.

Other areas of excellent business conditions are in Texas and in the northern part of the country. A number of factors account for the good showing in these regions, including enormous oil production in the southern part and good wheat crops in the northern section, including the Prairie Provinces of Canada.

Throughout most of Canada business conditions are about the same as they were a year ago. Activity has been lagging a little in the extreme eastern part of the country but this trend has been offset by the continued high rates of activity in the major industrial areas. Large pay rolls in manufacturing, high farm income, and war production assure a continued high level of business volume.

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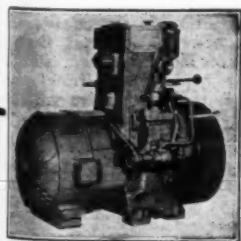


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West Coast Diesel News

By JIM MEDFORD

THE 70-foot *North Pacific*, trawler, shark or bait fisherman, powered with a 6-cylinder, 120 hp. Atlas Imperial marine Diesel has been delivered to Carl Serwold by the Tacoma (Washington) Boat Building Co.

WITH a 600 hp. supercharged Union marine Diesel, one of the top seiners operating out of Astoria, Oregon, a 90 footer, belongs to Spiro Babich. Builders were Pacific Boatbuilders of Tacoma, Washington.

ANOTHER Buda marine Diesel goes into a San Francisco Bay fisherman. Built by Nunes Bros. of Sausalito, Cosimo Volante's new 58-footer gets a 175 hp. engine and will fish hook-and-line.

VANCOUVER, B. C. is installing three Buda marine Diesels, too—85-hp. engines in a B. C. Packers' tender; the two 45-foot seiners *Kwatsu* and *Canadian Girl* and the 45-foot halibutor *Fisher Boy*.

CATERPILLAR marine Diesel engine sales in the San Francisco Bay district include a pair of 60 hp. engines to Colberg Boat of Stockton, California, and a single unit of same hp. to Angelo Pisano, Alameda.

AT San Diego, California, the Campbell Machine Co. will build its second new long range tuna clipper—a 127-footer. Engines are Union marine Diesels, main 840 supercharged hp., auxiliaries a pair 125 hp. to generators.

REPOWERED by Atlas Imperial marine Diesels, is what they say about the *New England* and *America 4* at San Pedro, California. Each got a new 60 hp. engine for the old 45 hp. Atlas Diesels.

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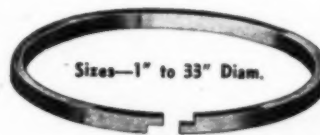
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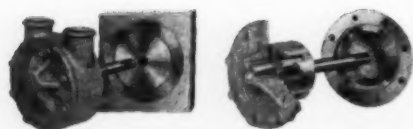
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Manzel Model 94 Lubricators deliver oil in accurately metered amounts against pressure. They start, stop, speed up and slow down with the engine. Feed is easily adjusted and very accurate.

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Gray Marine Diesels

These are the "Series T1" two-cycle Diesel engines developed and built by General Motors, adapted and equipped for marine propulsion by Gray. 1 to 6 cylinders, 25-166 H.P. Both Rotations

Reduction Ratios to 4.4:1
Fresh water cooling is standard

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590 Canton Ave., Detroit 7, Mich.

AND no less than six market boats at San Pedro got new Atlas-Lanova Diesels for auxiliary service—*Islander, Briskey, Anna, Ann, Wilberta* and *Islander* all of Van Camp Sea Food fleet.

FOR the French Sardine Co., San Pedro, the Western Boat Yard has delivered a 96-footer with 400 hp. Atlas Imperial marine Diesel to Nick Mezin. Twin 70 hp. Atlas Diesels are the auxiliaries.

NEWPORT Harbor, California, makes news with the first 65-foot tunaman to come off the ways. Built by Darrell King for own account, the engines are all Lorimer Diesels—200 hp. main and two 50 hp. auxiliaries with generators.

A TURBO-SUPERCHARGED 600 hp. Enterprise Diesel is the main engine in the new Tacoma-built 86-ft. tuna clipper for the Ocean Fisheries Co. by the Tacoma Boat Building Co., (Washington).

IT'S a 250-hp. Enterprise marine Diesel for the 82-ft. *Santa Anna* built by Martinolich of San Francisco, California, for Joe Lucide of Monterey purse seine fleet.

FOR Captain Joe Rogers of San Diego, California, the 95-foot tuna clipper *Linda Jo* has been delivered by Hodgson-Greene-Haldeman, Long Beach. Engines are Superior Diesels—320 hp. main, and two 100 hp. auxiliaries. Pumps and motors are Fairbanks-Morse.

POWERED with a 400 hp. Enterprise marine Diesel, a 70 hp. Atlas Diesel for auxiliaries, Fairbanks-Morse generators, motors and pumps, the 96-foot seiner *Ronnie M* has been delivered to Anton Misetch by Western Boat Yards, Tacoma, Washington.

BUILT for general fishing service in northern waters, the Queensborough Shipyards, New Westminster, B. C., has delivered the 60-foot *Pacific Belle* to Will Pitre. Engine is a Murphy marine Diesel of 135 hp. with Twin Disc gears.

REBUILT by Lynch Ship Yards, San Diego, California, the clipper *Lusitania* has retained her 300 hp. Enterprise Diesel but added two Caterpillar auxiliary Diesel generator sets and new Fairbanks-Morse pumps.

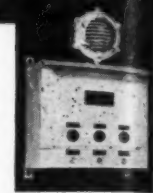
THE Lynch yard has also repowered the 70-ft. hook-and-liner *City of Naples* with a new 6-yl., 125 hp. Atlas Imperial marine Diesel and added

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How to design, operate and maintain a Diesel or gas engine power plant

This authoritative, practical book offers practicing engineers all the information needed to make economic studies for new installations. Gives a sound understanding of the functional capacities of required equipment in plant use. Brings you a thoroughly workable and comprehensive guide for the designing of new installations or additions to existing installations.

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By Glenn C. Boyer
Associate Engineer, Bureau of
McDonnell Engineering Co.
667 pages, 182 illustrations,
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This book covers the entire power plant from its inception to completion, covering in detail economics, design, testing, operation and maintenance. Includes up-to-date information which will enable the designer to estimate construction and operating costs of new plants, and provides a standard of comparison for operating costs in existing plants. Mechanical and electrical features are presented from the view of both the designer and operator.

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Large selection—All sizes and types. Generator units, marine engines, gasoline engines, auxiliaries—also boilers, steam motors, turbo generators.

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two 70 hp. Caterpillar Diesel generating sets and General Electric motor-driven bait pumps.

AT the Robbins Marine Ways, San Diego, the 52-foot fishing vessel *Punta Redonda* has been reconditioned including the installation of a new Fairbanks-Morse 65 hp. marine Diesel replacing an older model of same make.

A NEW 130 hp. Superior marine Diesel has been installed in the 65-ft. clipper *Felice* by the San Diego Marine Construction Co., who also installed a 65 hp. Caterpillar Diesel in the fish tender *Golden West*.

ALL Caterpillar marine Diesel engined, five new fishing boats have been delivered by the Kettenberg Boat Works, San Diego, California. Of the same size, 38 feet, they are equipped with Twin Disc gears and go to Santa Barbara and San Diego owners.

Latest Diesel Patents

A description of the outstanding patented inventions on Diesel and Diesel accessories as they are granted by the United States Patent Office. This information will be found a handy reference for inventors, engineers, designers and production men in establishing the dates of record, as well as describing the important Diesel inventions.

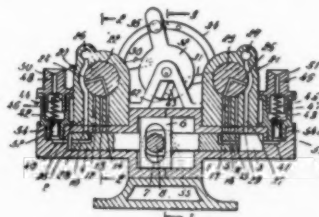
Conducted by C. CALVERT HINES

2,319,566

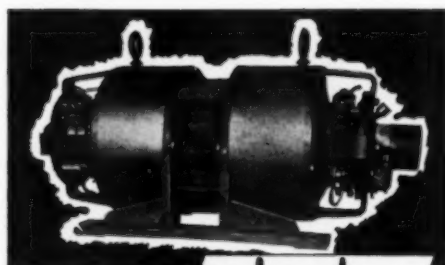
FUEL PUMP

Frederick R. Sunderman, New York, and James McAuley, Bronx, N. Y., assignors to F. S. McLachlan Co., Inc., a corporation of New York
Application May 2, 1941, Serial No. 391,532
2 Claims. (Cl. 123-140)

2. A fuel pump for internal combustion engines which comprises at least one pair of opposed pistons each reciprocable in its own cylinder, a crank means for driving each piston, an oil passage in each piston, a valve for each piston having an oscillatable valve member, a by-pass in the valve member; a conduit connecting an oil storage system, the valve and the pump cylinder; a plurality of ducts connecting each cylinder with each valve at spaced intervals in the longitudinal direction of the cylinder, said ducts being arranged to effect selective and co-



incident engagement with the by-pass by adjustment of the valve member to vary the quantity of oil in each injection, means responsive to the speed of the engine operatively connected to the valve member whereby the valve member is adjusted in accordance with the speed of the engine to throttle the passageway between the duct and the by-pass and thereby varying the supply of fuel to control the speed of the engine.



New MOTOR-GENERATOR

A decided space-saver—perfect for larger units.

Motor and generator (which mounted on common shaft) are secured to twin center frames and integral base, with cooling blower between.

Note Bakelite brush support rings—safeguards against grounding.
1 to 15 K. W. Either AC-DC or DC-AC
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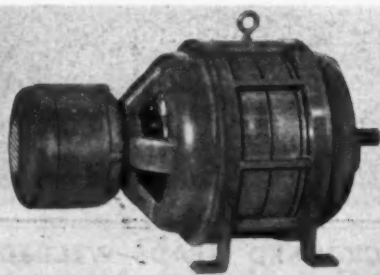
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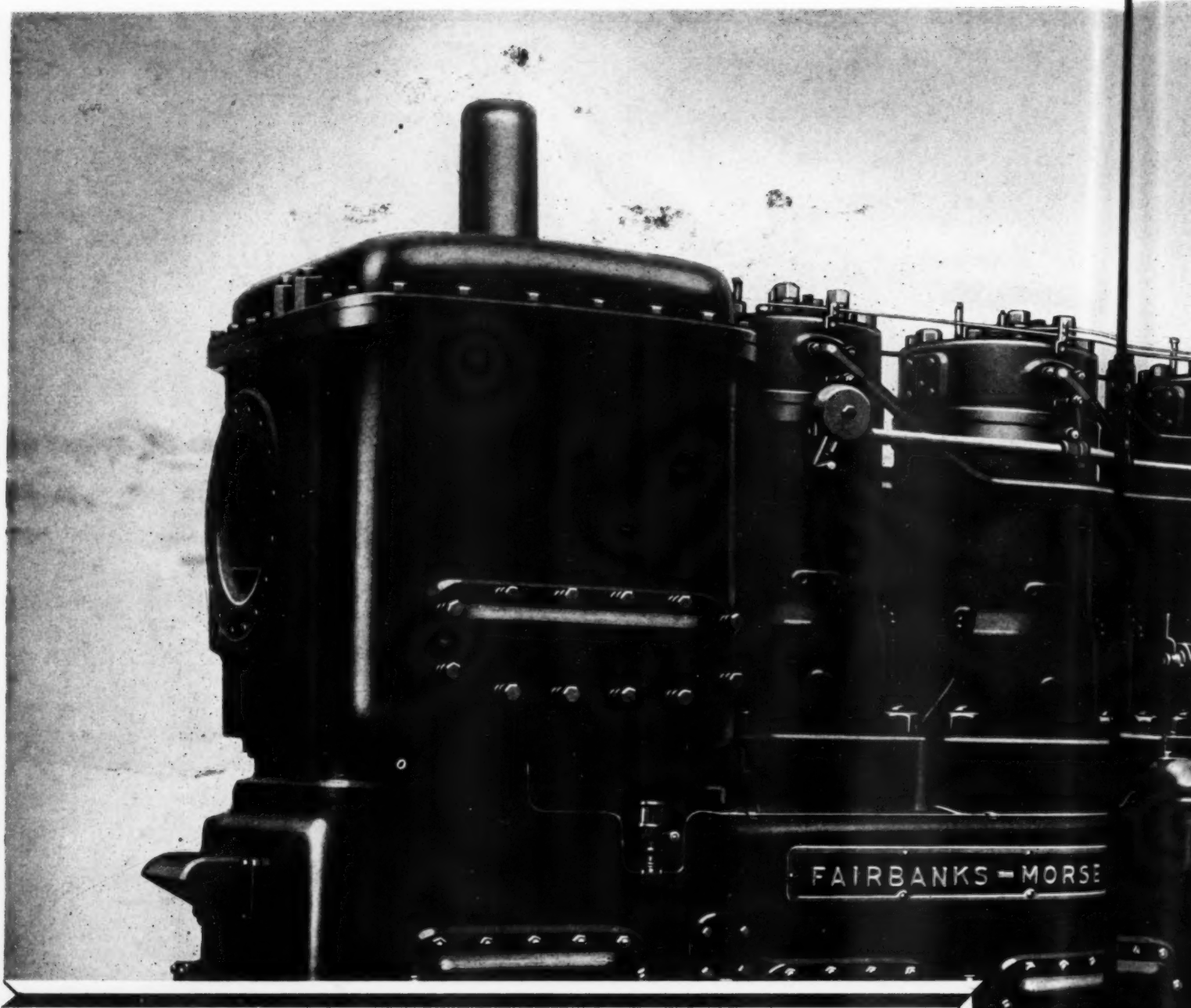
Their list of achievements in the heavy jobs of war is almost endless.

Working with American engine builders, American Bosch has supplied precision fuel injection equipment for many thousands of fighting Diesels. After Victory, the same quality of production, the same experienced engineering counsel, will be available in meeting the world's needs for power as an important ingredient of a lasting peace.

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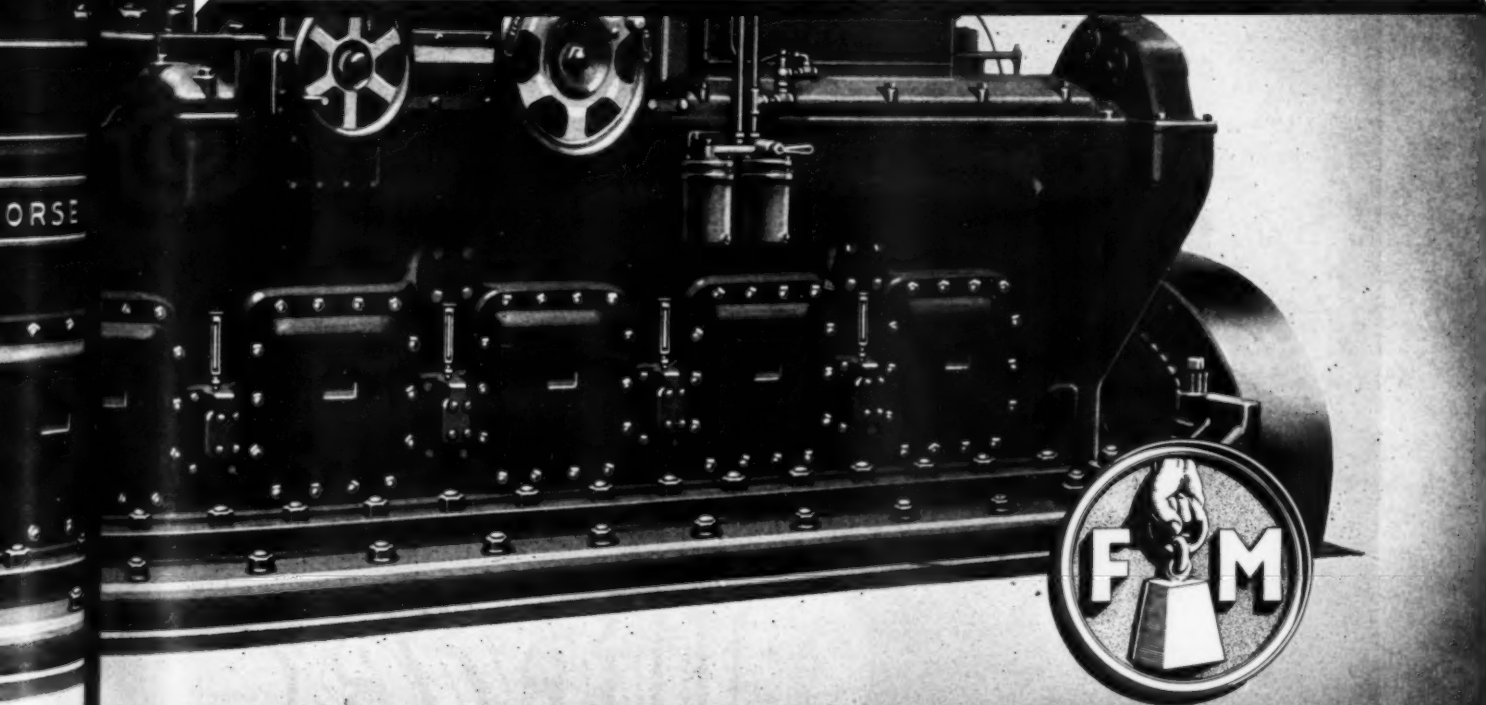
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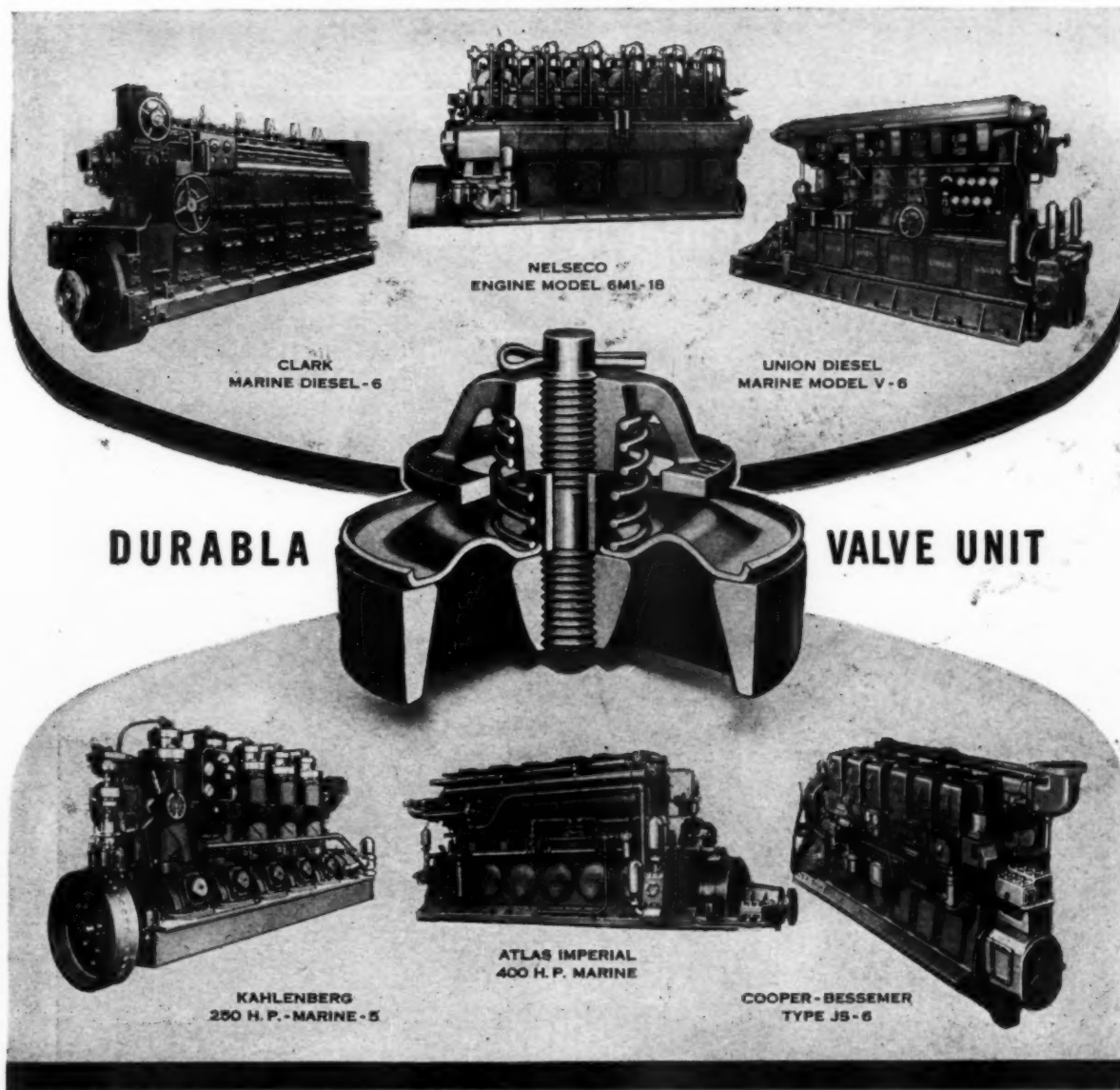
- Undoubtedly the versatility of Titeflex will find many applications in your own plant for your wartime or postwar planning. We'd like you to write for our catalog No. 113 which gives specifications on Titeflex and which suggests many applications of which you might not otherwise think.

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*Patent Numbers 209486, 2117804.



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War Research by Wausau



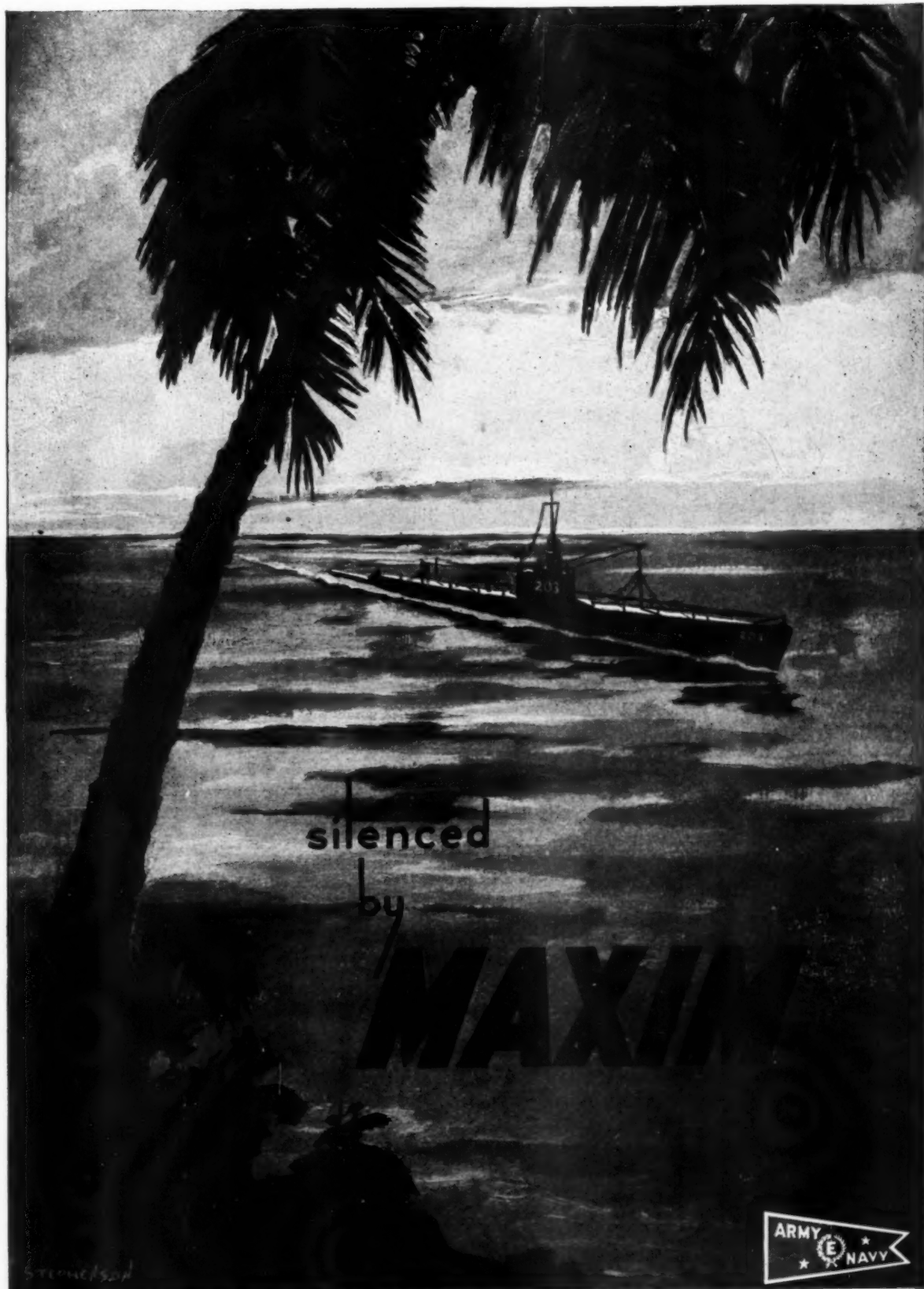
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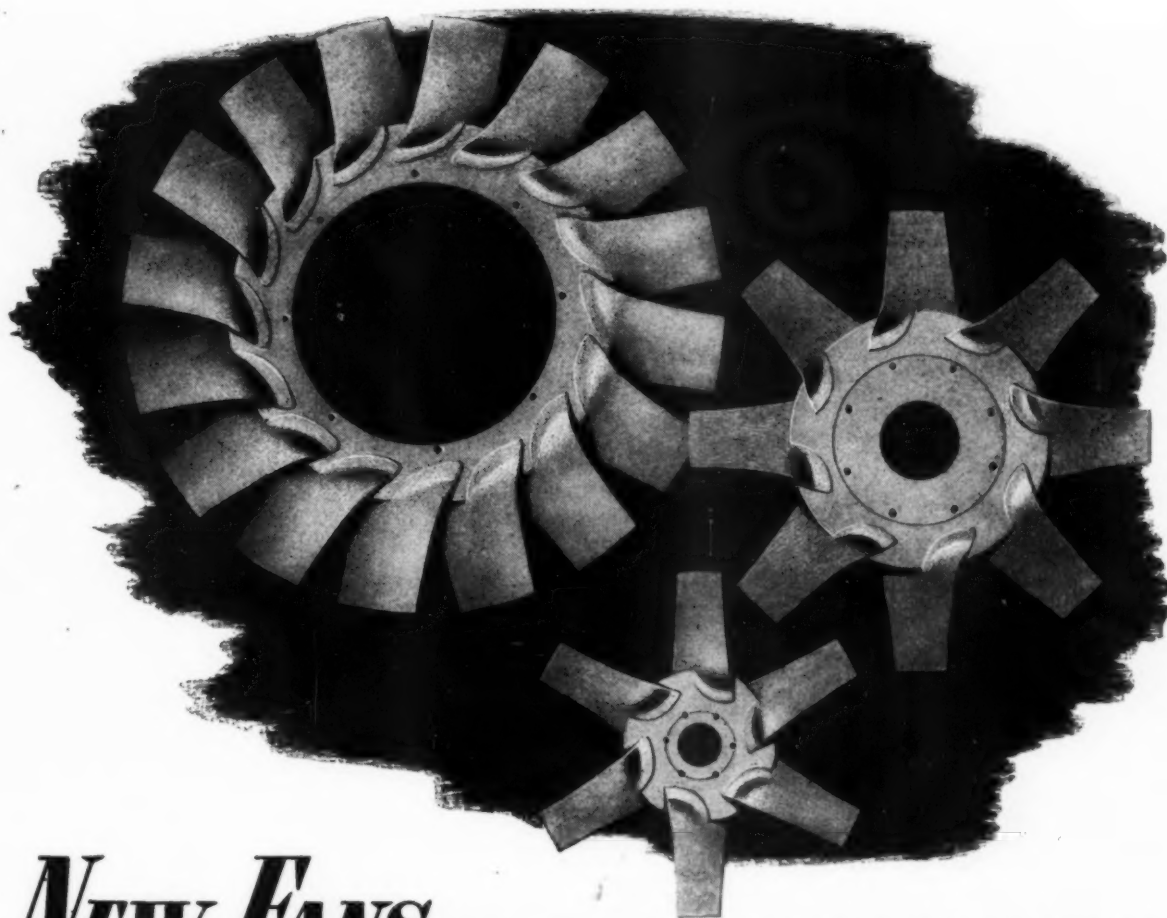
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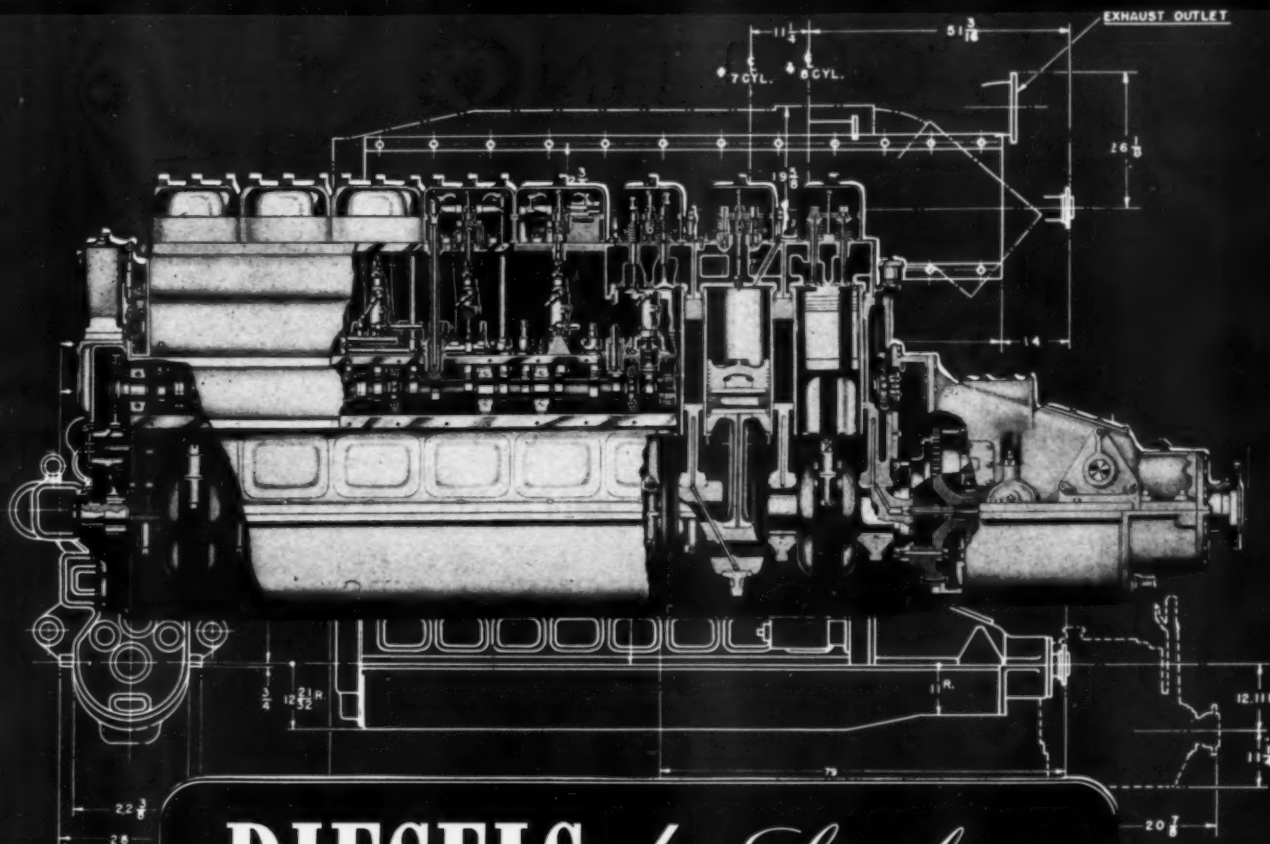
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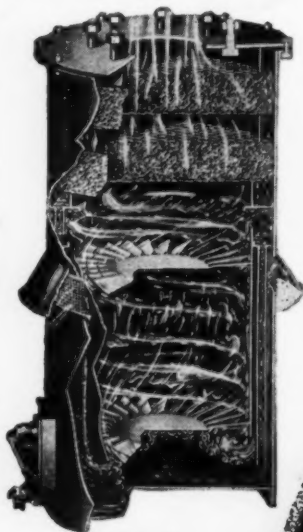
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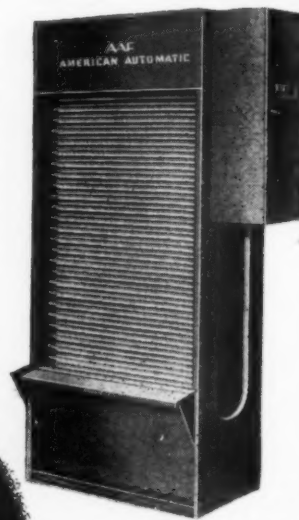
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For engines and compressors subject to extremely heavy dust concentrations. Principle of operation provides four way cleaning—1. impingement, 2. scrubbing, 3. cyclonic action, 4. filtering, thus assuring continued self-cleaning action and large dust-holding capacity. Acts as effective intake silencer as well. Write for Bulletin 130-D.

For multiple engine or compressor hook ups, multi-cylinder, and four-cycle and two-cycle engines scavenged by rotary blowers the Automatic filter is especially suitable. Practical for air volumes of 5,000 cfm or more. For detailed information on its operation and self-cleaning principle write for Bulletin 241 A.



**SELF-CLEANING
AIR FILTER**

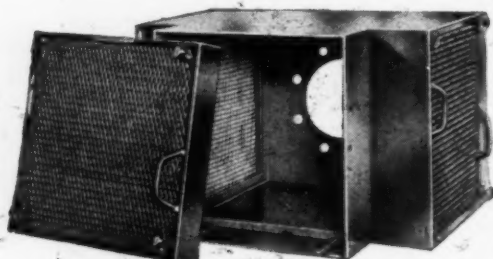
AAF AIR CLEANER PROTECTION

**Means
LONGER LIFE
AND
LESS REPAIR COST**

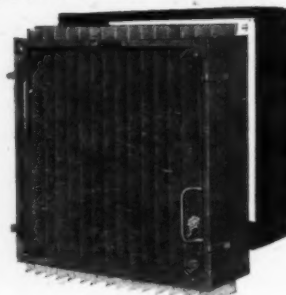
Composed of complete assemblies of individual viscous impingement type cells and housings which bolt directly to flange on air intake pipe. Installed outside or inside the buildings. Sturdily built for long years of service. Recommended particularly for use in industrial districts involving normal dust concentrations. Write for Bulletin 120 D.

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BONDS**

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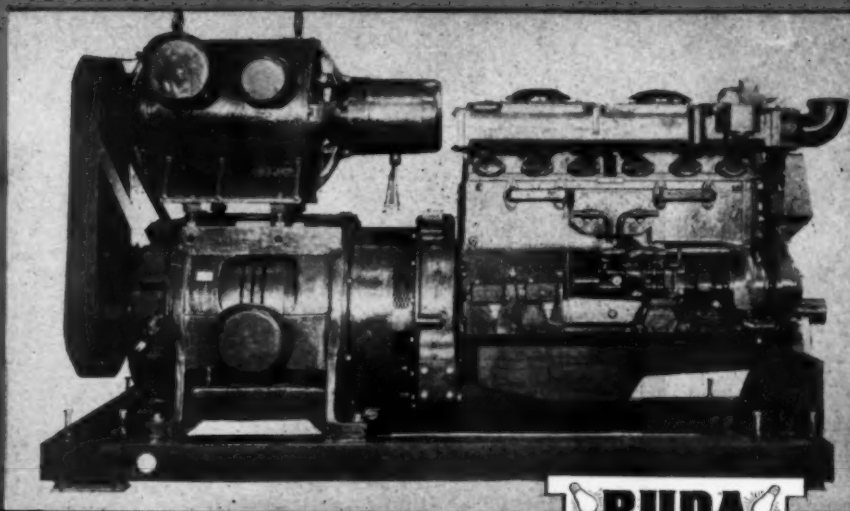
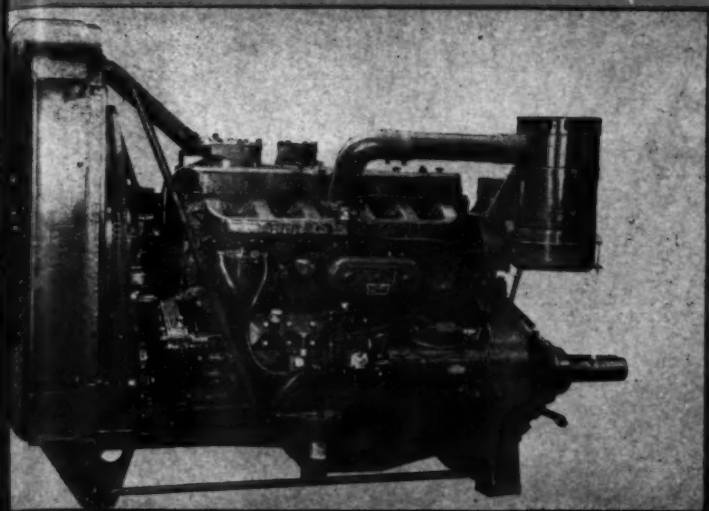
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for Engine and Compressor Protection





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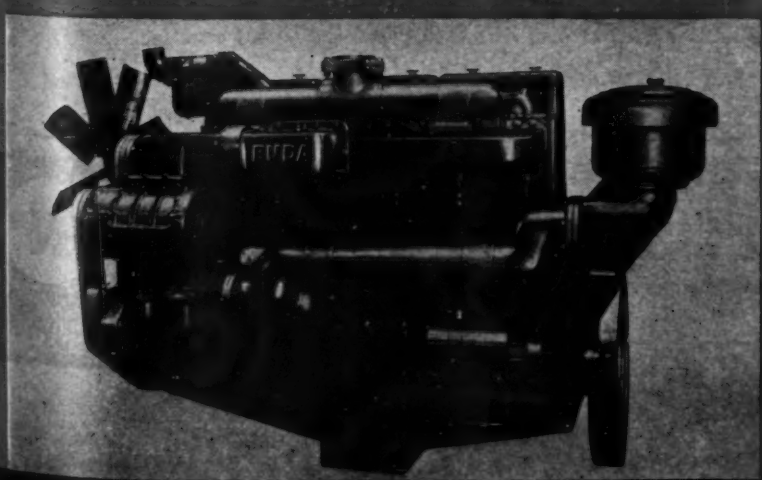
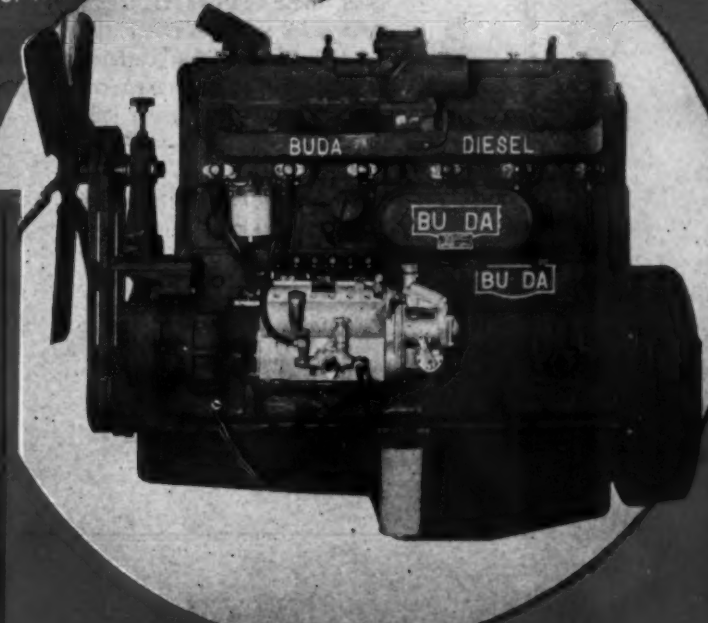
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These distinctive types of Buda-Lanova Diesels, and many more—thousands of each type—have seen grueling war service in all kinds of marine, automotive, mobile, portable and stationary equipment. That they have given good account of themselves is evidenced in that the armed services on land and sea have come back for more and more—Buda-Lanova Diesels are advancing on our fighting fronts throughout the world. Our engineering and manufacturing skills are advancing with them. A great line of war-tested Buda-Lanova Diesels awaits the already evident peace-time market.

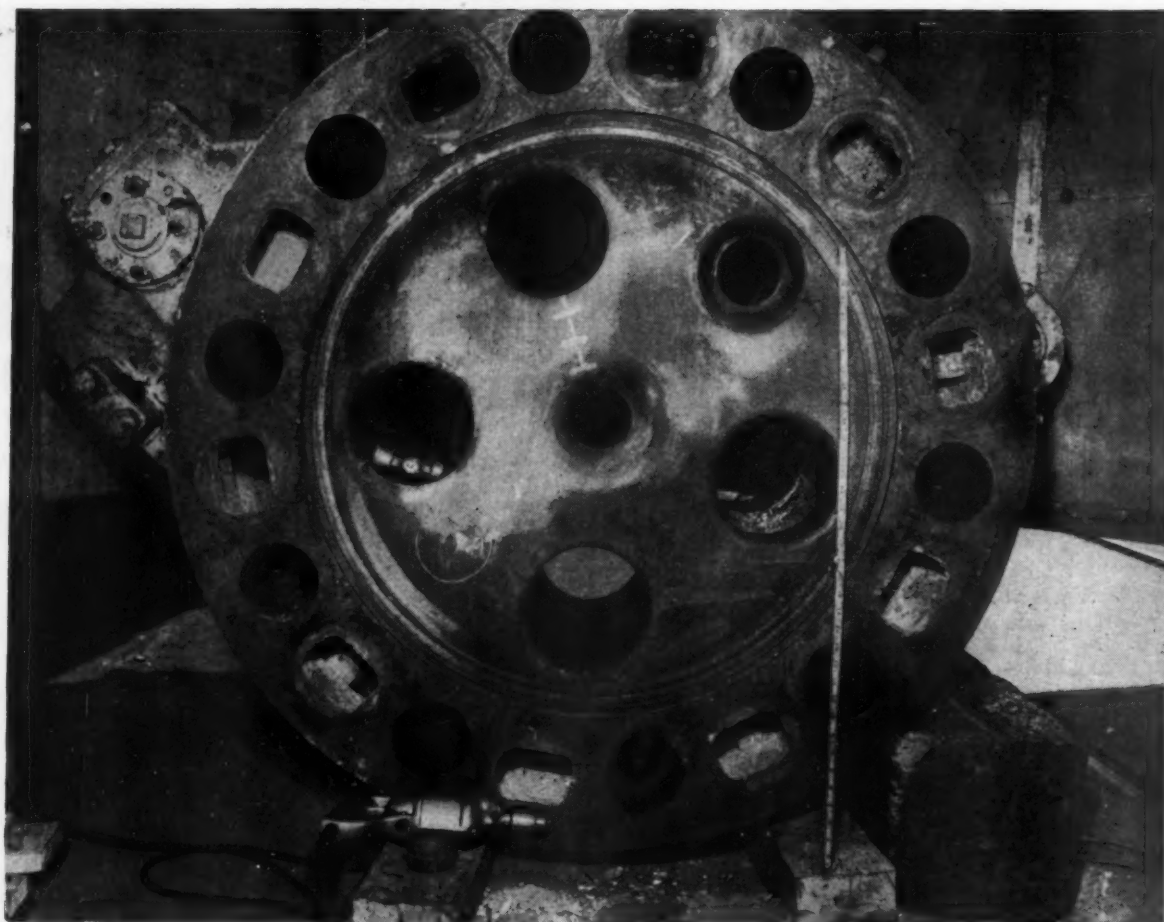


THE BUDA CO.

ESTABLISHED 1881
HARVEY CHICAGO SUBURB ILLINOIS



BUDA-LANOVA DIESEL. *for more Horsepower Hours per Dollar*



Diesel Engine Cylinder Head Repaired by HARMAN "Save-A-Weld" Process

The above illustrated job, although on a very large marine head, was really a very simple repair when using the Harman "Save-a-Weld" Process. It is but one of thousands of examples where a Harman Process repair has saved a great deal of expense and materially cut down time lost in getting cracked or broken castings back into operation. In almost 100% of the cases where the "Save-a-Weld" Process has been used, these repaired castings have given service equal to that expected of new parts. In these war days, time saved in getting essential equipment back in service is an aid to speedier victory. With manpower so short, the ease and certainty of making "Save-a-Weld" repairs appeals to all operators. This process renews cracked or broken castings without welding, restores up to 85% of original strength, makes stress-free and leak-proof joints.

The Harman "Save-a-Weld" and "Vel-o-Weld" processes are not only ideal for repairs to heads and other broken cast parts of Diesel engines, but they are used by thousands of companies all over America for getting all types of cracked or broken cast iron machinery back on duty quicker and more inexpensively.

*For information about how YOU can save money
by using the Harman Process, write or phone*

HARMAN PROCESS CO.

401 Montana St.

EL PASO, TEXAS

Phone Main 1764



Mites with a Mission

"Mighty mites" of the task force, PT boats thunder into action against enemy ships that dwarf them in displacement, armament and armor. Yet in their torpedo tubes the PTs have a weapon that can inflict mortal wounds on a carrier or battlewagon; and in the power of their engines they have their sole defense against superior enemy firepower . . . the defense of *speed*.

Obviously, these all-important engines must not fail. Overheating could cripple them, but against this danger they are safeguarded by a Harrison cooler in a closed circuit cooling system which provides for

the circulation of uncontaminated fresh water through the water jackets. Lube oil temperatures, too, must be maintained within an effective range, and this assignment is accomplished by compact, dependable Harrison oil coolers.

In every type of ship in the United States Navy, Harrison heat transfer products are performing useful, essential functions. Whatever the job, they represent Harrison's long research and many developments in the science of temperature engineering.

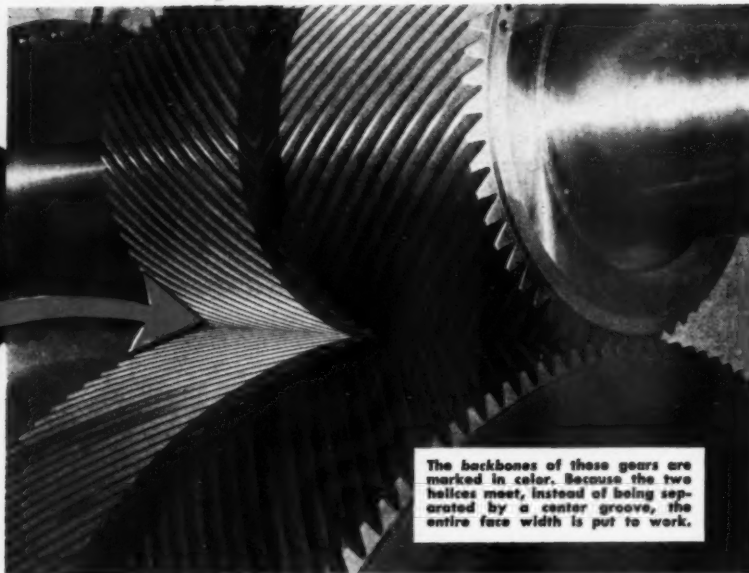
WAR BONDS ARE FIGHTING DOLLARS



HARRISON
HEAT EXCHANGERS

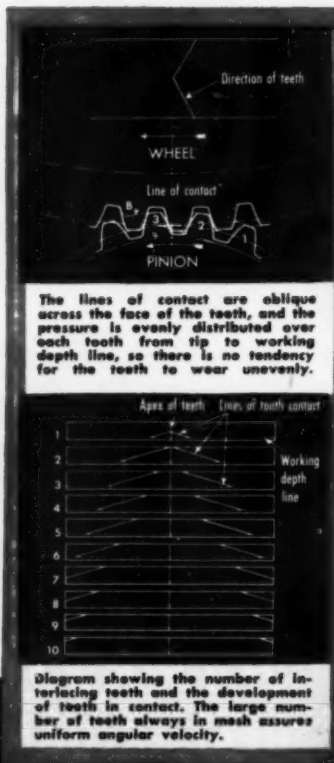
HARRISON RADIATOR DIVISION OF GENERAL MOTORS, LOCKPORT, NEW YORK.

*
The "more than thirty types of vessels," in which the Gear with a Backbone is used, includes submarines, mine-sweepers, net tenders, salvage vessels, submarine chasers, tugs, cruisers, destroyers, destroyer escorts, tankers, cargo vessels, freighters, ferries and dredges.



The backbones of these gears are marked in color. Because the two helices meet, instead of being separated by a center groove, the entire face width is put to work.

What is this GEAR WITH A BACKBONE that is used in more than 30* types of vessels?



THE *Gear with a Backbone* is so called because the teeth comprising the two helices meet in sharp apices, instead of being separated by a center groove, as is the case with some gears. This *backbone* provides extra strength and higher load carrying capacity in small space—a definite advantage for any type of vessel.

But this is not the only feature of these gears. Precision cut by the famous Farrel-Sykes method of generation, their combined characteristics of overlap or interlacing of the teeth, gradual engagement and inclined line of pressure contribute to smooth, quiet operation, and maintenance of correct tooth action throughout the life of the gears.

For details of the *Gear with a Backbone* and the Farrel propulsion gear drives in which they are used, write for descriptive bulletins. No cost, no obligation.

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN., BUFFALO, N. Y.

New York: 3700 Chrysler Building
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Farrel-Birmingham

HOW
TO SOLVE
OPERATING
PROBLEMS WITH

Correct Lubrication

Keep Rings Free

Combat Sludge in
the Crankcase

Get Clean Performance WITH A CLEAN ENGINE!

LARGE automotive-type Diesels, like this, must stay clean inside, if they are to keep on pouring out power . . . day in and day out.

The answer is Delvac 900 Series Oil, specially developed by Socony-Vacuum for use in automotive-type Diesel engines.

This detergent-type lubricant, now serving U. S. Army and industrial operators on every front, resists the formation of oil oxidation deposits, keeps rings free

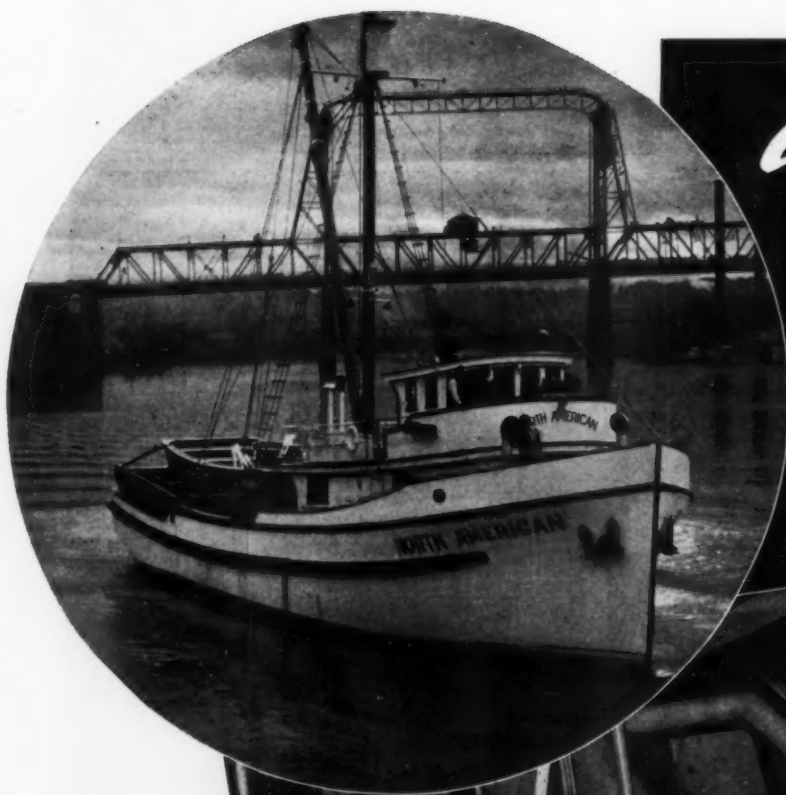
from gum, lacquer and varnish and combats sludge in the crankcase. Also, it protects hard-alloy bearings from corrosion.

Your whole engine runs far cleaner and safer. Yes, and it runs far *more continuously* with minimum maintenance costs.



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CALL IN SOCONY-VACUUM



Another
FIRST *for*
Buckeye
Diesels



This is the sleek new postwar purse seiner **NORTH AMERICAN**, built for Messrs. Jaangaard of Seattle by Tacoma Boatbuilding Co. — An up-to-the-minute fishing vessel with an 8-80 Buckeye Main engine.

Already there are many Buckeyes on the seas, lakes, and rivers, giving that long dependable service so common to this well-known engine.

Be Profitwise and Dieselize with Buckeyes
THE BUCKEYE MACHINE COMPANY LIMA, OHIO

Design that part in

ArmaSteel*



The metal that boosts output, cuts costs, saves time, when "GO-Day" comes

IN THE AUTOMOTIVE AND DIESEL INDUSTRIES

PISTONS



A leading Diesel manufacturer has used ArmaSteel pistons for years, chalking up impressive records of continuous service.

GEARS

Faster gear production through casting closer to finished dimensions and easier machining is a leading advantage of ArmaSteel.



CLUTCH THROWOUT COLLARS



The special qualities of ArmaSteel well fit it for the heavy loads and wear to which throwout collars are subjected.

The time lag from plan board to finished product can be cut sharply with ArmaSteel, the metal that has proved its mettle in hundreds of strategic war uses. In your reconversion plans consider these factors:

1. ArmaSteel is cast to conform closely to final shapes, cutting machining time, lowering cost of manufacture and reducing scrap loss.
2. ArmaSteel is much easier to machine than steel bar stock and forgings of the same Brinell hardness.
3. ArmaSteel has a uniform structure and a high yield ratio, with good fatigue and wear properties.
4. ArmaSteel responds to selective hardening by any of the commercial processes, such as induction, flame-hardening or bath immersion.
5. ArmaSteel maintains its properties at sub-zero temperatures.
6. ArmaSteel may be machined and polished to the mirror finishes so necessary to reduce friction.
7. ArmaSteel can be cast to combine several parts in one integral casting, thereby reducing machining and assembly costs.
8. ArmaSteel can be heat-treated to cover a wide range of physical properties.

Leading manufacturers have proved ArmaSteel to be an exceptionally versatile material, adaptable to varied requirements and lending itself to time-saving techniques.

Investigate ArmaSteel. It may effect savings and improvements in your product. Write us, detailing your requirements. Specify ArmaSteel in your reconversion plans.

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SAGINAW, MICHIGAN

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WYANT
& CANNON
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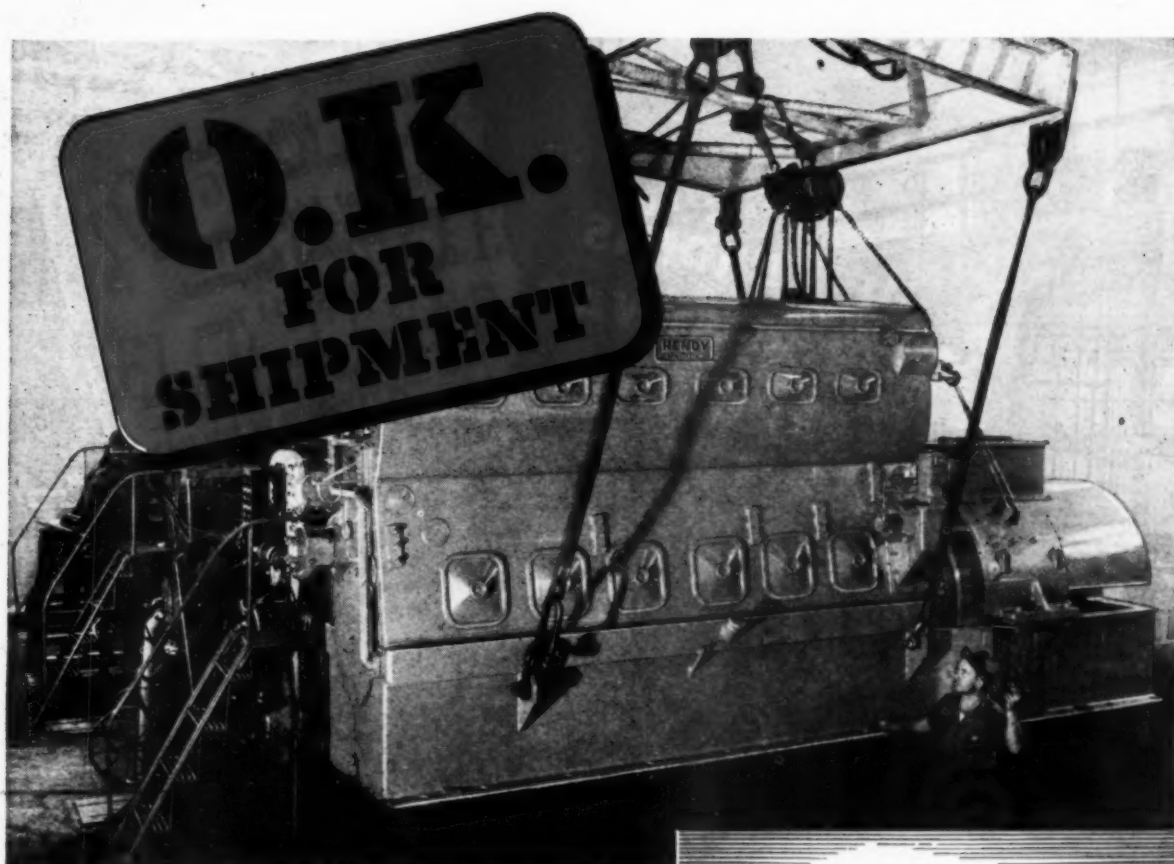
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Casting eliminates the restrictions upon design that are inherent in other manufacturing methods. C.W.C.'s revolutionary foundry practice and their development of new alloyed metals provide physical properties otherwise unattainable.

Perhaps your product *should* be cast! Call in a C.W.C. engineer for consultation today!

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PRODUCTS OF C.W.C. METALLURGICAL ENGINEERING: Cylinder Blocks • Cylinder Heads • "Centrifuse" Brake Drums
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In addition to the above products, C.W.C. has facilities for producing Electric Furnace Alloyed Steel.



Now "DIESELS by HENDY" for the Maritime Commission



To the long list of Hendy products built for the Maritime Commission in the past few years is now added *Diesel generating sets*... of a new and advanced type. Coming off the production line in a steady stream, these 250-kw plants for the AV1 Cargo Ships are another example of Hendy's ability to design, produce and deliver—to combine precision workmanship with mass production.

The experience gained in building the engines for over one-third the entire Liberty Ship Fleet...the 4000-, 6000- and 8500-hp turbines and reduction gears for cargo and hospital ships... and turbo-generators of many types, made possible the remarkable delivery record of these Hendy Diesel generating plants.

Hendy Series 50 Diesel engines are available as direct-reversing main-propulsion units, as main-propulsion units for vessels with electric drive... or with Crocker-Wheeler generators, as auxiliary power plants. Orders are now being accepted for early deliveries. Write for complete information, stating your power requirements.

WRITE FOR DATA ON THE HENDY SERIES 50 DIESEL 375 to 675 hp

This modern Diesel offers 22 proved features in design never before available in a single engine. Direct-actuated dual valves, unit-type fuel injectors, overhead camshaft, hydraulic tappets and oil-cooled pistons are just a few of them. You, as a Diesel operator, will appreciate these and the others—for, combined, they are responsible for the high operating efficiency of Hendy Diesels. Catalog available on request.

JOSHUA HENDY IRON WORKS
ESTABLISHED 1836
SUNNYVALE, CALIFORNIA

Branch Offices: BOSTON • BUFFALO • CHICAGO • CINCINNATI • CLEVELAND • DETROIT • NEW YORK • PHILADELPHIA • PITTSBURGH • SAN FRANCISCO • ST. LOUIS • WASHINGTON

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DRIVE IDEAS FOR POSTWAR PRODUCTS

The Applications of Diamond Roller Chain Drives Have Marked Important Advancements in Machinery and Equipment During the Past 54 Years

Look over the few examples of Diamond Chain Drives illustrated—there may be an idea or two that you can adapt to your postwar machinery or equipment.

During the past 54 years, the records reveal that when major machinery improvements have been made—when greater efficiencies and speeds were demanded—these radical advancements generally entailed the use of Diamond Roller Chain Drives.

Before your postwar models and new products are completely designed, investigate the advantages of precision-made, high efficiency roller chains. Diamond engineers are ready to aid you with practical recommendations. A copy of General Catalog 617 containing useful engineering data will be mailed on request. DIAMOND CHAIN & MFG. CO., 407 Kentucky Avenue, Indianapolis 7, Ind.

This book, Catalog 617, has 96 pages of Roller Chain Drive data. Copy on request.

10 REASONS Why Diamond Roller Chains Can Help IMPROVE YOUR PRODUCTS

- 1 Ease of Installation.
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- 3 No slip or creep—constant speed ratios maintained.
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- 9 Load Distributed over Many Teeth.
- 10 Quietness—Cushioned and matted on films of oil within the chain.

DIAMOND  **ROLLER CHAINS**

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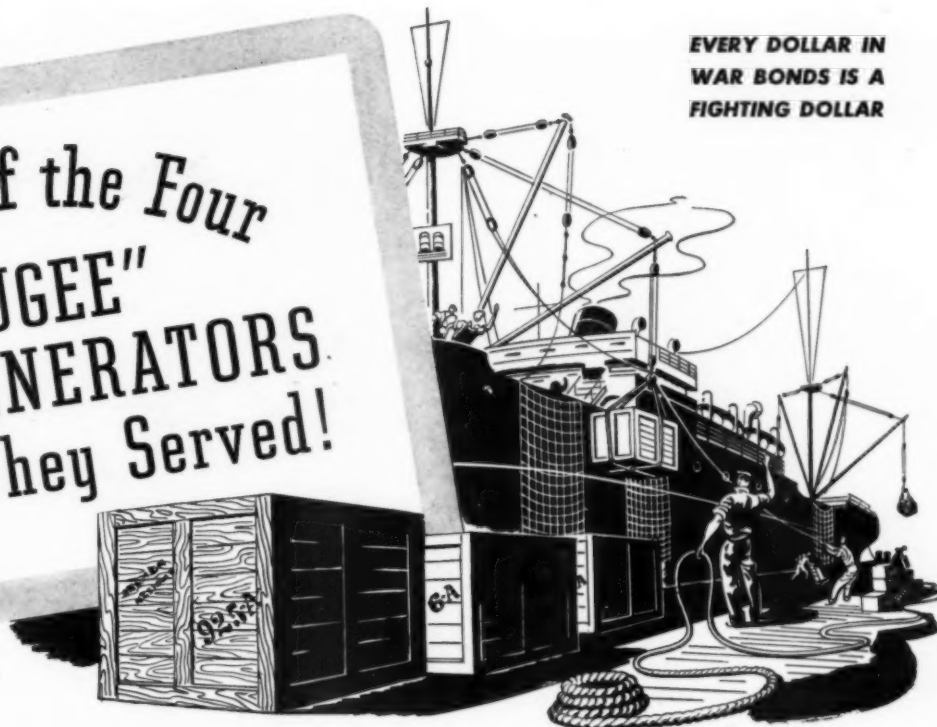
Here's

but no
sugges

DEL
PRODU
DAYTON

The Story of the Four "REFUGEE" DELCO GENERATORS and How They Served!

EVERY DOLLAR IN
WAR BONDS IS A
FIGHTING DOLLAR



At the outbreak of the war, four Delco generators and their Diesel engines were on the high seas bound for Dutch colonies in the Southwest Pacific. Jap conquests in the Pacific changed this destination, and the power plants were landed in Australia as "refugee cargo engines."

Who owned these Diesel engines and Delco generators was a puzzling question of international law. But to the Fifth Air Force in New Guinea, which came into possession after various Allied government agencies had taken them in charge, they were like a dream come true! No time was lost in putting them to work, and they have been doing a job ever since for the Fifth Air Force headquarters, the Fifth Bomber Command and repair shops.

Here's what happened to the "refugees":



At an advance base close to enemy outposts, in the heart of New Guinea, lumber was needed for bridges, shelters and other construction work. The mill equipment was on hand—but no power was available to run it. When someone suggested that a power plant could be flown in by

cargo plane, there were many who thought the plan impossible. Yet within a few hours a "refugee cargo" Delco generator and Diesel engine were being unloaded on the still-unfinished landing strip, and in a few hours more the mill was in operation.



Two other "refugee" power plants were "adopted" to run machines in two airplane hangars. They arrived without installation or operating data, but Yankee ingenuity made that omission a minor matter. Within a few hours, electric lines were stretched from tree to tree leading to the hangars, and the units were supplying power for the machines! They've been running 16 to 24 hours daily ever since, and not one failure has occurred.



The fourth and last "refugee" Delco generator and Diesel engine are supplying power, often 24 hours a day, for operating the headquarters of the Fifth Air Force. The power requirements of transmitters, teletype machines, lights and other headquarters equipment keep the units overloaded most of the time, but to date there has not been a single power let-down.

DELCO GENERATORS are coupled with AMERICA'S GREAT DIESELS



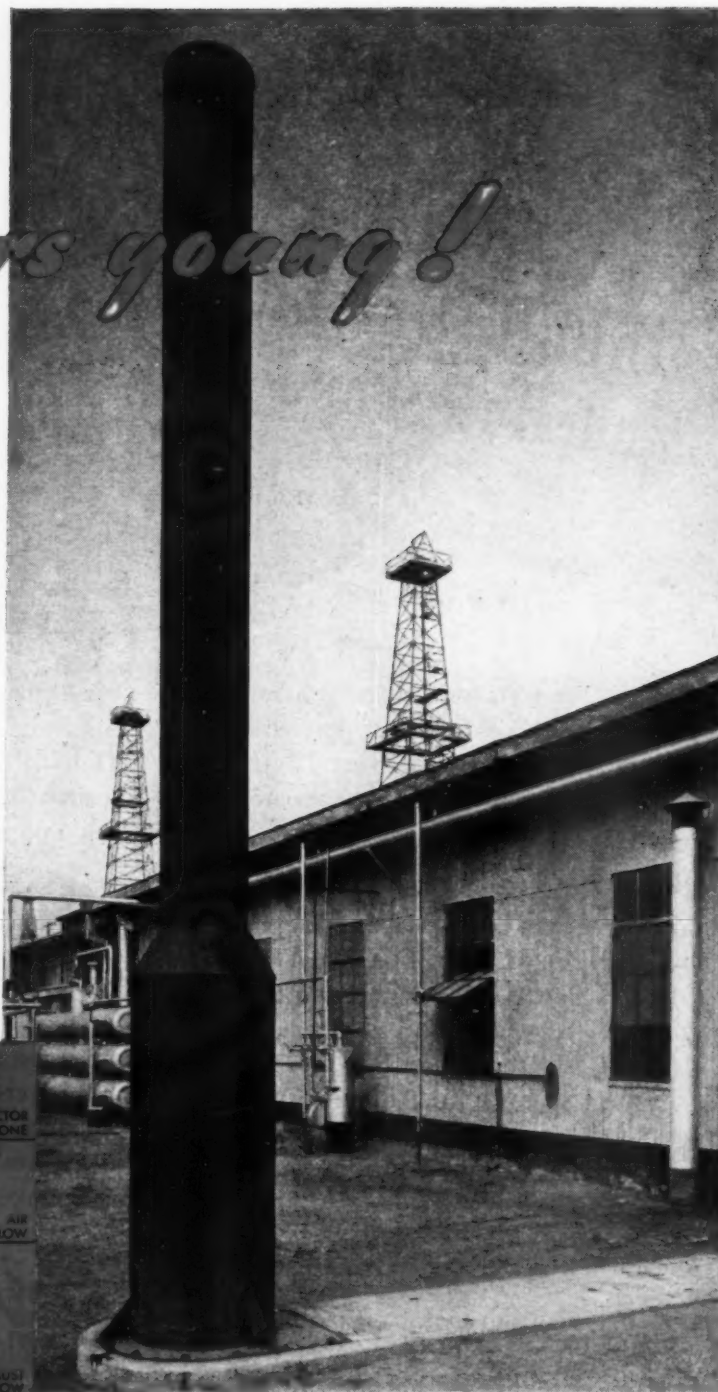
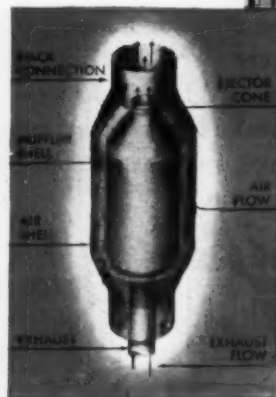
**DELCO PRODUCTS DIVISION
GENERAL MOTORS CORPORATION**



14 years young!

This Fluor Air-Cooled Muffler has been in almost continual service for 14 years...and it's good for many more. Fluor Air-Cooled Mufflers are designed and built to stay on the job...with a minimum of maintenance...for years after the ordinary muffler corrodes or burns out. They pay their way in longer service and lower operating costs, plus many other exclusive advantages.

FLUOR Air-Cooled Mufflers are fully protected by U. S. Patents and Patents Pending.

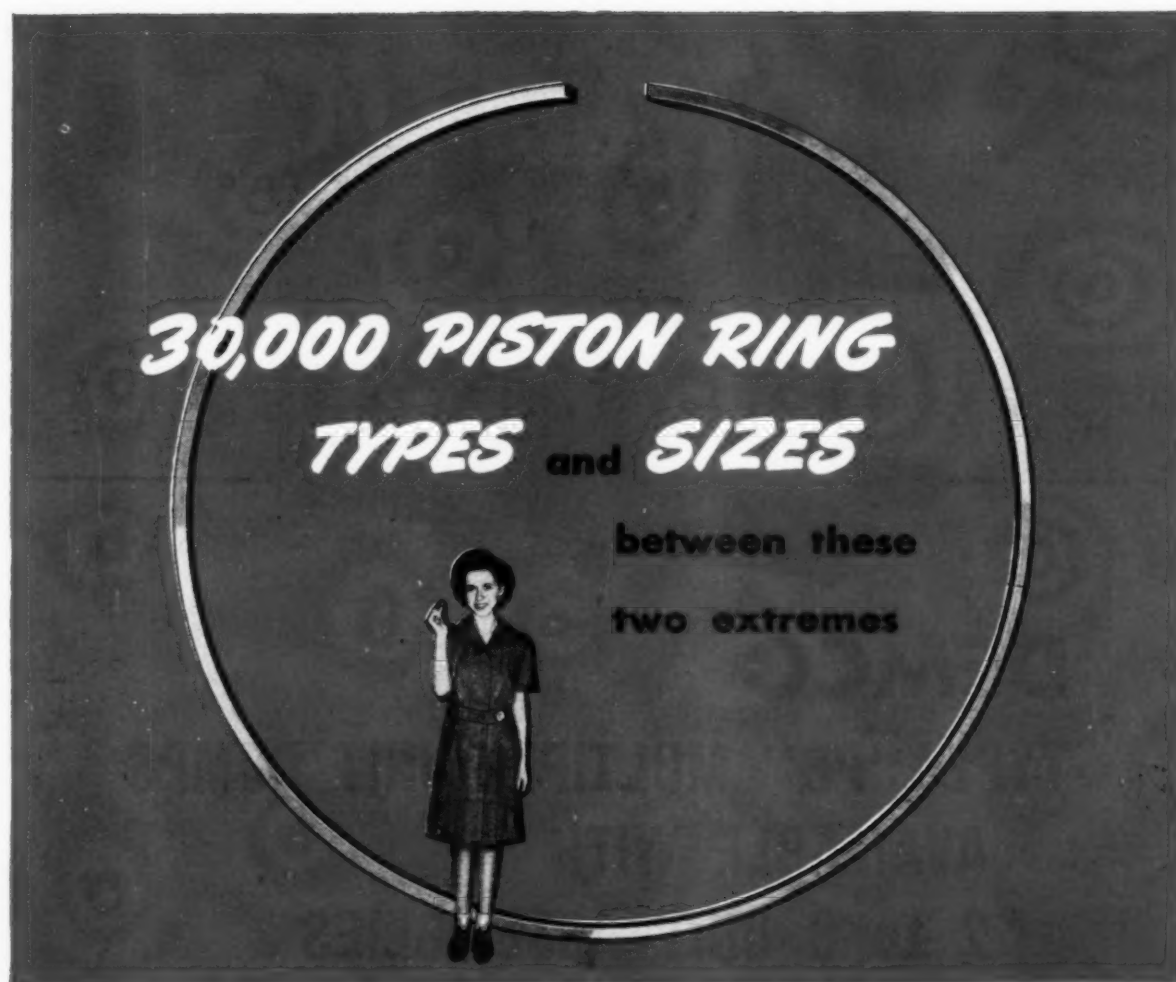


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ENGINEERS • MANUFACTURERS • CONSTRUCTORS

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THE FLUOR CORPORATION, LTD., 2500 S. ATLANTIC BLVD., LOS ANGELES 22 • New York, Pittsburgh, Kansas City, Houston, Tulsa



The smallest piston ring we make (you couldn't get it on your little finger) is used in the watch-like mechanism of the torpedoes that are helping to snip Japan's lifeline.

The largest piston ring we make (it's over 30 feet around) has done and is doing duty on over three-fourths of the Liberty ships whose wakes are writing V's for Victory all over the Seven Seas.

And in between these two extremes are 30,000 other types and

sizes of piston rings—for which we have patterns in our foundry. This tremendous range of ring patterns, always available, made American Hammered a unique source of supply for the most diversified requirements.

Another important service asset is know-how . . . and that has been strikingly expanded during the war years. The PORUS-KROME*

treatment that increases the life of piston rings two—three—and even four times, and the new alloy rings with double the tensile strength of any pre-war product, will let you demand more from your piston rings . . . and get it.

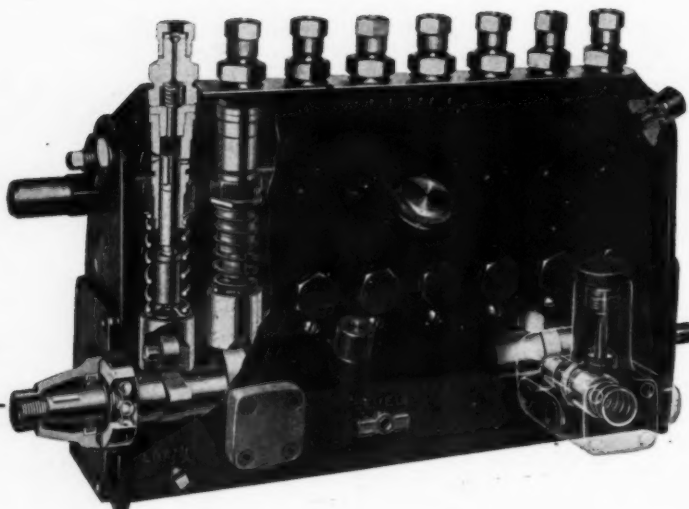
Rings in every size—of every type—for every purpose make this the best place to bring your ring problems. Koppers Co., Inc.—American Hammered Piston Ring Division, Baltimore 3, Md.

* Van Der Horst Process

Buy Extra War Bonds—and Keep Them!



The first Army-Navy "E" awarded exclusively for piston ring production.



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AVAILABLE WITH

2 to 8 UNIT ASSEMBLIES

Demco Multiple-unit In-line Pumps provide original and individually unique features found in no other make. They are interchangeable with other makes. New pumping units are installed without need for recalibration. The pumping unit (plunger and barrel) is removed from the pump housing (upward) without necessity of removing the camshaft and tappets. Exceptionally close tolerance manufacture, needless to say, results in highly efficient and above average dependable operation with minimum servicing. The features and advantages offered by Demco Pumps are of special interest to you, if service time is at a premium. Ask for complete information on these and the complete line of Demco Pumps, Nozzles and Nozzle Holders.

DEMCO
DIESEL ENGINEERING & MANUFACTURING CORP.
200-214 NORTH LAFLIN STREET • CHICAGO, ILLINOIS



*Talk
about*



LOW MAINTENANCE COST!

Work boat owners who keep accurate records are continuously calling our attention to the low maintenance costs encountered in the operation of Atlas Diesels. A recent case in point is the record of a pair of 400 H.P. direct reversible Atlas Diesels in the Columbia River towboat "SHAVER," owned by the Shaver Transportation Company of Portland.

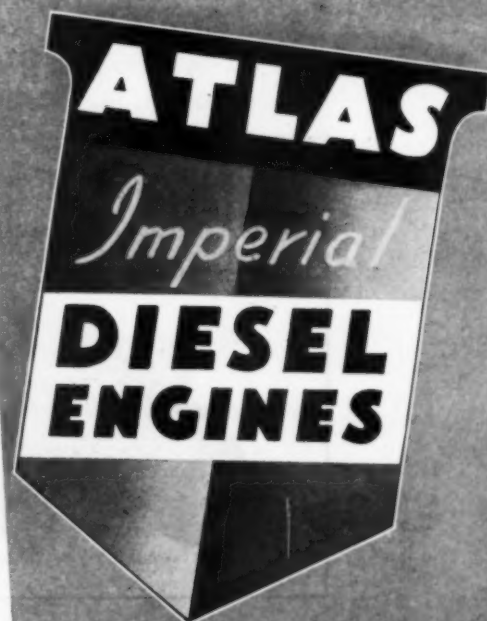
These engines were installed in the "SHAVER" in the fall of 1926, replacing steam power, and the boat placed in service towing log rafts averaging a million board feet. At the end of 3 years the log book showed 17,500 hours operation. Pistons were pulled, valves ground, new rings installed, and the bearings checked for the first time. An average of .005 shim was removed from each bearing.

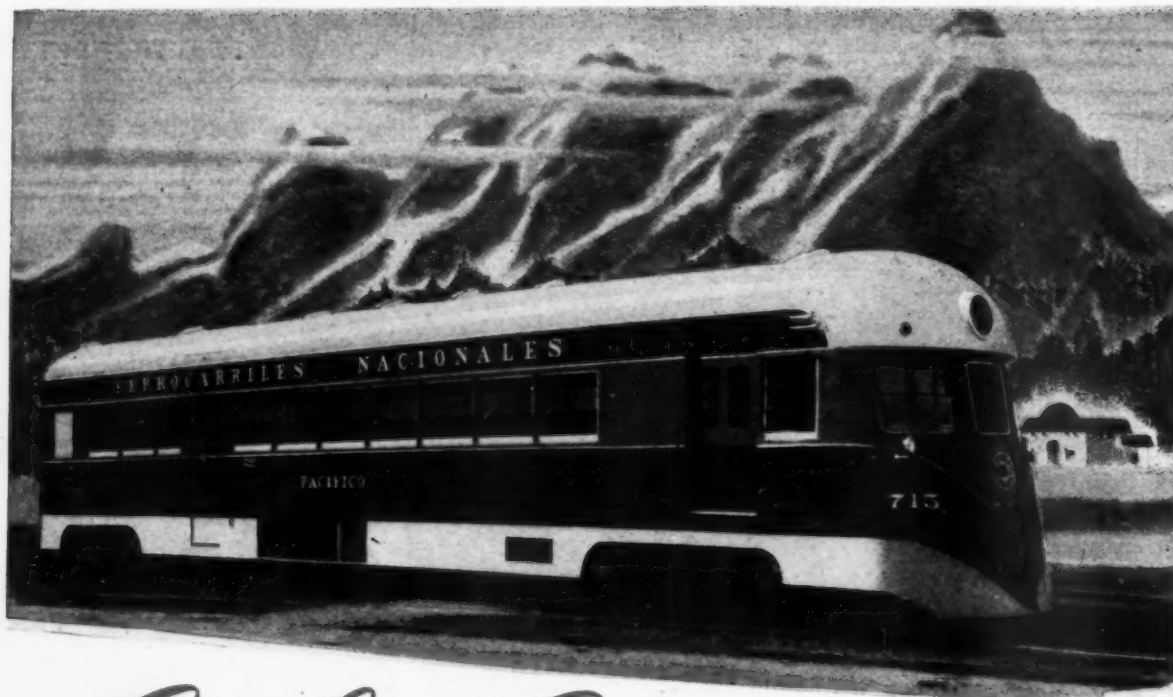
Three years later, after completing another 17,500 hours of operation, identical repairs were again made with the same results. Checking their maintenance costs carefully, Shaver officials found that the Atlas maintenance had cost but 74.6c per H.P. per year.

During the 18 years service this vessel has now completed, one new set of cylinder liners has been installed, and the crankshaft rebored with one new set of bearings. Shaver operates 15 Atlas Diesels, each from 10 to 22 years old, and maintenance costs on all have been similar.

ATLAS IMPERIAL DIESEL ENGINE CO.

SAN FRANCISCO • CHICAGO • NEW YORK • HOUSTON
SEATTLE • VANCOUVER • TERMINAL ISLAND • ASTORIA • KETCHIKAN
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Sea Level Power **12,000 Feet Up** **B-W SUPERCHARGED ENGINES ...**

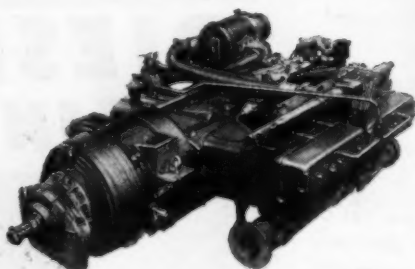
Pull These Motorailers Over The Andes

Faster acceleration from standstill... power to negotiate steep grades... sea-level performance at Bogota and points 12,000 feet up—these requirements were readily met by the twenty self-propelled rail cars delivered before the war to the Colombian Nat'l Railways.

Built by American Car & Foundry Company, these cars were driven by Waukesha-Hesselman engines supercharged with B-W (McCulloch) Superchargers.

Not only have these supercharged engines met all power demands of the motor rail cars with their trailers, but have also enabled these cars to take the place of unobtainable locomotives in hauling strings of freight cars.

Two of these horizontal type Waukesha-Hesselman six cylinder, electric-ignition engines, suspended under the floor, constitute the power plant of each rail car. Note supercharger in upper corner. It is driven by a V-belt from extension of the crankshaft.



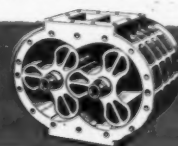
SUPERCHARGERS, Inc.

Formerly
McCULLOCH
ENGINEERING CORP.

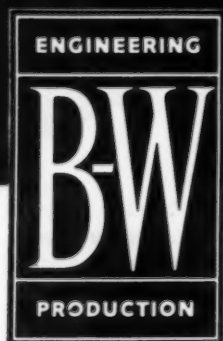
DIVISION OF BORG-WARNER

Milwaukee 9, Wisconsin

B-W Positive Displacement Superchargers supercharge at all speeds and in proportion to the need of the engine for air.



Partners with the Diesel Industry in War and Peace ★★★



BORG-WARNER

When peace returns, Borg-Warner will again make these and other products for the Diesel Industry— BRAKE INTENSIFIERS • CLUTCHES • CLUTCH ACTUATORS • CLUTCH DISCS • CLUTCH SPRINGS • FLAT SPRINGS AND STAMPINGS • FUEL, VACUUM, GEAR AND HYDRAULIC PUMPS • FLUID COUPLINGS • GEARS • HEATER ELEMENTS • OVERDRIVE AND SYNCHRONIZER UNITS • RADIATORS • REPLACEMENT PARTS • RUBBER TO METAL ADHESIVES • STABILIZERS • STEEL STAMPINGS • TIMING CHAINS AND SPROCKETS • TRANSMISSIONS • UNIVERSAL JOINTS • VALVE SPRINGS • WHEEL DISCS

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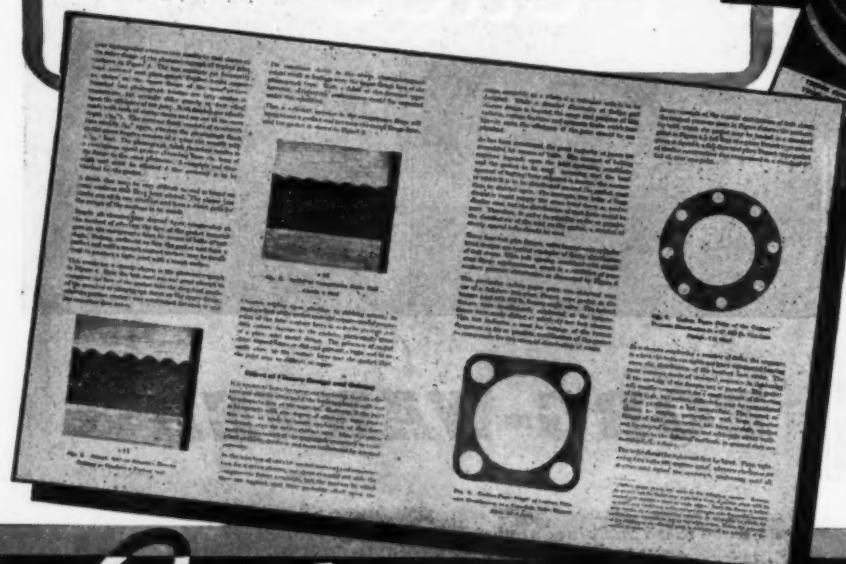
To provide highest joint efficiency — especially mandatory for confining dangerous or corrosive fluids or for withstanding high temperatures and pressures — Goetze, at once, must be expert in metallurgy, mechanical engineering, steam engineering and chemistry.

The unique laboratory at the Goetze plant, continuously engaged in research in the effects of metallic structure upon gasket performance, the determination of true gasket yield stress value and gasket factor, proper flange and bolt specifications, etc., has amassed a wealth of original data of interest to engineers and designers of pressure equipment.

These data are being published in a series of technical bulletins — a part of Goetze service to Industry. If you wish to receive these bulletins regularly, write on your letterhead, mentioning your position.

Also available — a handy up-to-the-minute gasket chart showing the cross sections of 36 most popular gasket types, their purposes and the characteristics which fit them for the specific services intended — is yours for the asking.

GOETZE GASKET & PACKING CO., Inc.
32 ALLEN AVENUE, NEW BRUNSWICK, NEW JERSEY



LOWELL THOMAS Speaks on New Gasket Film

Now available to employee groups, technical societies, engineering schools and other organizations throughout the country, this new 35-minute Kodachrome film, "Only a Gasket," tells why these are the "Biggest little things" in modern industry. Write for full information.

Goetze for **GASKETS**
"America's Oldest and Largest Industrial Gasket Manufacturer"





FAST—POSITIVE—PRECISE
Derrick Maneuvering
with
W·A·B controls

W·A·B controls help to give military precision to the maneuvering of the crane aboard this U. S. Army 125-foot floating derrick. Four W·A·B Flexair valves, which can be seen at the left in the pilot-house picture, actuate the clutch and brake on whip-line, main load-line and boom, and the brakes on the cable drums which swing the boom from side to side.

Clutches and brakes are operated by W·A·B double-acting cylinders, pre-loaded on one side to assure snappy response. Movement of the Flexair valve handle to forward position engages the clutch. Lateral movement at midpoint releases the dogs on the drums, and pulling handle to rear position sets the brakes. Test runs showed that this sequence could be carried through so rapidly that there was no load movement whatever.

W·A·B Remote Control Systems are handling everything from searchlight training to complete maneuvering functions of multiple-engine ships. You'll find some interesting and helpful information in our Marine Bulletin 1DA-9471-2. May we send you a copy?

Westinghouse Air Brake Company



MARINE DIVISION

General Offices: Wilmerding, Pa.

75 Years of Pioneering



W·A·B



Pneumatic • Pneumatic-Electric • Pneumatic-Hydraulic

remote control systems

Constant Hair-splitting to give you Constant Performance

The great part that close tolerances play is one of the reasons why Busch-Sulzer Diesels are noted for their ability to give year after year of reliable and economical service.

For example, every eight hours, when a new shift reports, all gages are given a microscopic examination capable of disclosing errors in millionths of an inch. Only when a cross-hair exactly splits two other cross-hairs is the gage under examination up to Bureau of Standards specifications and ready for work.

This hair-splitting precision plus the skill of America's oldest builder of Diesels has resulted in engines famous for their simplicity of design, which makes for fewer moving parts, better lubrication, less wear and long life.

* * *

At the moment that the progress of the war permits, our greatly expanded facilities will be at your disposal without reconversion delays. Acquainting us now of your requirements will be a time-saver. We build both 2-cycle and 4-cycle stationary and marine Diesels with a variety of speeds. An inquiry on your letterhead will get our prompt attention.

By actually splitting two tiny cross-hairs with a third cross-hair, this microscopic inspecting instrument puts the O. K. for accuracy on the many gages used in Busch-Sulzer's close tolerance work.



**BUSCH-
SULZER**

ST. LOUIS

BUSCH-SULZER BROS.—DIESEL ENGINE COMPANY
SAINT LOUIS

America's Oldest Builder of DIESEL ENGINES

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cross-
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accu-
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work.

THEY SPIN — ON SILVER

7hings looked bad in '42.
Without tin, wheels
couldn't spin—we couldn't
win.

Then N-B-M brought out Silver
Babbitt to help break the bearing
bottleneck. After two years of
brutal punishment N-B-M Silver
Babbitt has proved itself equal to
tin-base babbitts on every count.
You can be sure of satisfactory
service when you specify

N·B·M
SILVER BABBITT

Write for our engineering briefs.

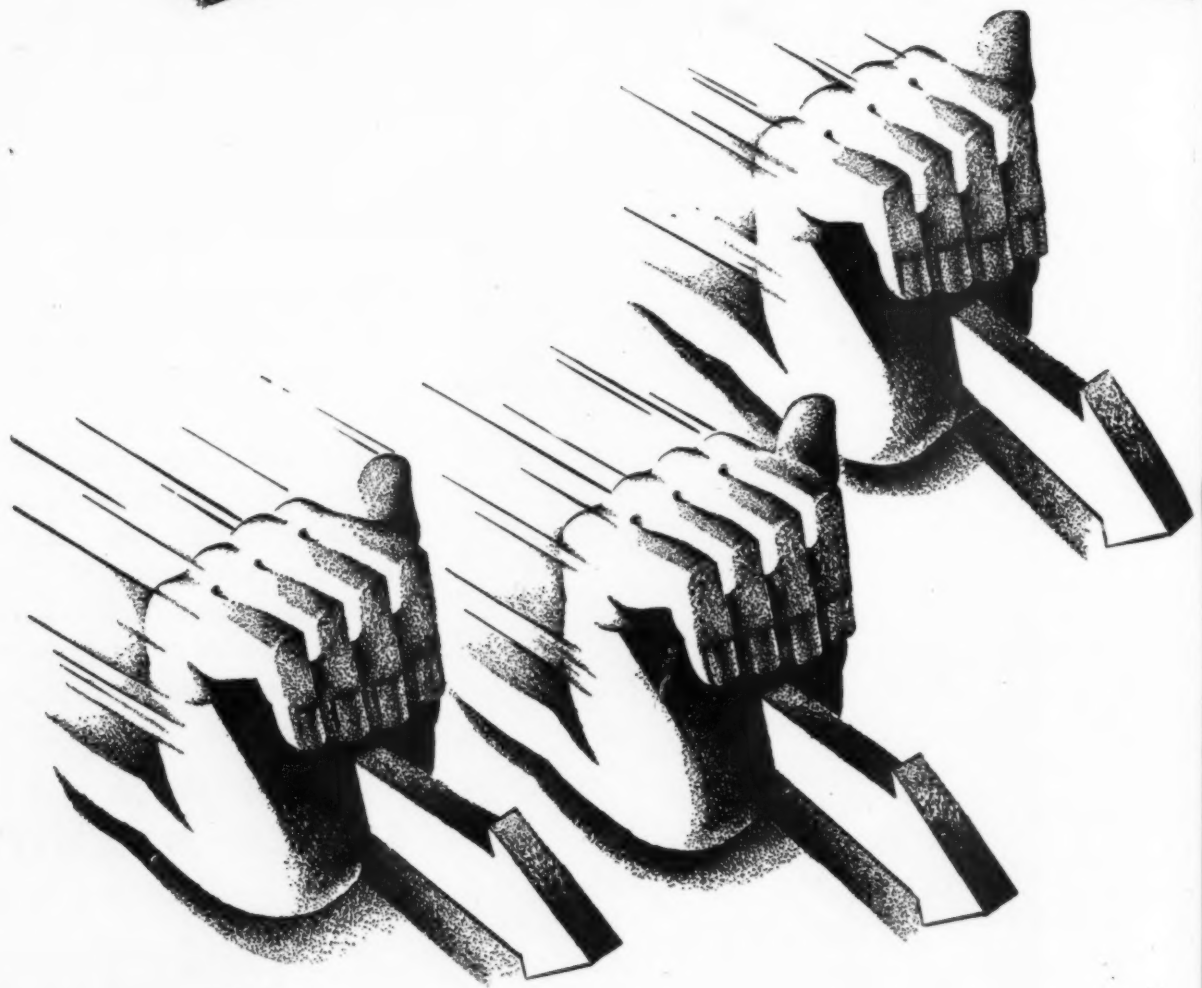
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THREE NEW PARTNERS... GOING



**— TERMINAL TOWER —
CLEVELAND, OHIO**

AHEAD WITH DRESSER

DRESSER INDUSTRIES now number ten.

Formerly, we were seven companies helping to bring basic services to the user more efficiently.

Our three new partners, each a specialist in its fields, both round out and broaden Dresser's scope of usefulness. This larger Dresser group can now serve industry and consumers with more products and greater experience.

The new Dresser members are bulwarked by an organization that assures their customers continued progress in product improvement, greater wherewithal for pioneering research and steady maintenance of service.

Dresser Industries, Inc., has progressed through the management principle of giving to alert, independent know-how an adequate backing and pooled resources. From these, each member draws teamed strength far greater than it could enjoy alone. The three new members of Dresser Industries, Inc., increase opportunities for mutual aid among the teammates, and at the same time, draw from the group advantages for those they serve.

MEMBER COMPANIES

Dresser Manufacturing Division
Bradford, Pa.

The Bryant Heater Co.
Cleveland, Ohio

Clark Bros. Co., Inc.
Olean, N. Y.

Pacific Pumps, Inc.
Huntington Park, Calif.

Bovaird & Seyfang Mfg. Co.
Bradford, Pa.

Dresser Mfg. Co., Ltd.
Toronto, Ont.

Van der Horst Corp. of America
Olean, N. Y. Cleveland, Ohio

PLUS

*International Derrick & Equipment Co.
Columbus and Marietta, Ohio
Torrance, Calif. Beaumont, Texas

*Roots-Connersville Blower Corp.
Connersville, Ind.

*Stacey Bros. Gas. Construction Co.
Cincinnati, Ohio



DRESSER Pipe couplings and repair devices for pipeline systems. Rings and forgings.



BRYANT Gas-fired boilers, winter air conditioners, furnaces, unit heaters and conversion burners for residential, commercial and industrial heating.



CLARK Engines and compressors for oil production and refining. Marine and stationary Diesel engines.



PACIFIC Hot-oil charging pumps; boiler-feed pumps; general-service pumps for the petroleum and other industries; oilwell plunger pumps; deep-well turbine pumps.



INTERNATIONAL DERRICK Oilwell pumping units, derricks and masts, drawworks, rotary tables and drilling units. Airport, communications and electric-power-line equipment and prefabricated steel buildings.



ROOTS-CONNERSVILLE Positive displacement and centrifugal blowers, exhausters, boosters and compressors. Air and liquid pumps and meters.



STACEY BROS. Storage holders, tanks and pressure vessels for the gas, oil, chemical and food industries.



BOVAIRD & SEYFANG Pumping engines, jacks, "powers", storage tanks and allied supplies and equipment for oilfields.



VAN DER HORST PORUS-KROME—a patented process of applying chromium lining on cylinder walls, piston rings and crankshafts—for longer wear.

DRESSER INDUSTRIES
INCORPORATED



1 PORUS-KROME applied to the cylinder walls of gasoline and Diesel engines multiplies the life of the cylinders from 4 to 20 times.

2 PORUS-KROME on the cylinder walls multiplies the life of the ordinary piston rings from 3 to 5 times.

3 PORUS-KROME, with its thousands of tiny pores and channels which hold lubricating oil and feed it back as needed, improves lubrication and holds lubricating oil consumption at a constant low level.

4 PORUS-KROME and piston rings wear so slowly that high power development is maintained for many more hours . . . many more miles . . . than with ordinary cylinders.

5 PORUS-KROME means greater engine reliability because it reduces scoring and scuffing and the risk of piston seizure and because it cuts down the number of overhauls caused by cylinder and ring wear.

All of these advantages add up to a substantial saving in engine operating costs.



U. S. PATENTS 2,048,678 AND 2,314,604

PORUS - KROME

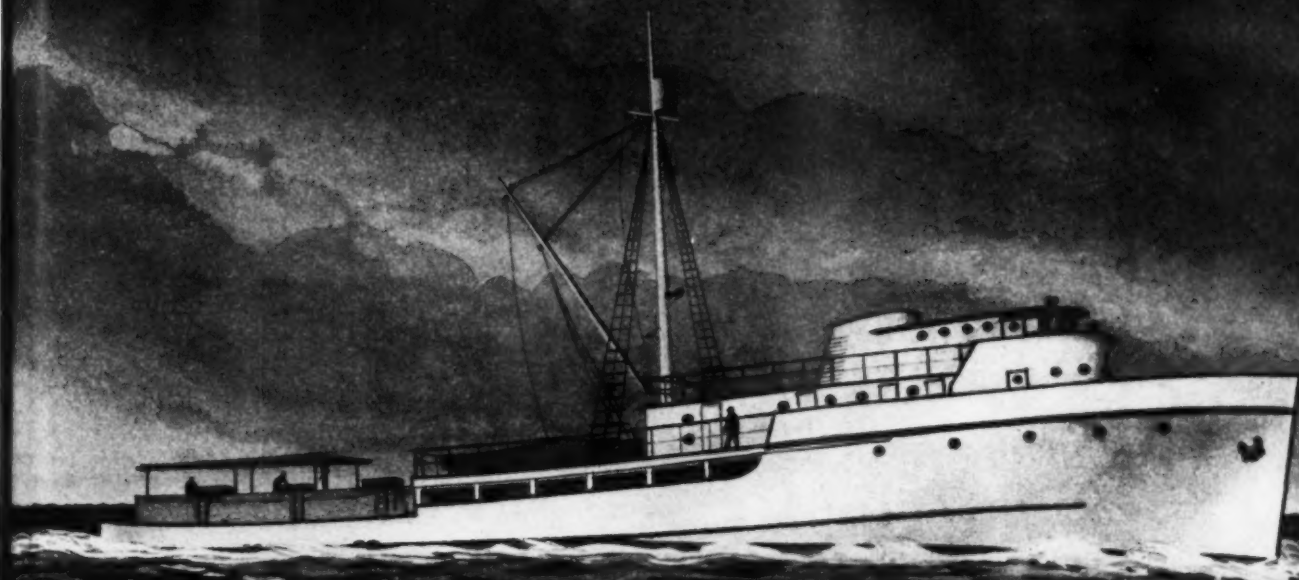
Good for the Life of your Engines

* PORUS-KROME is pure, hard chromium which is applied to cylinder bores by the patented Van der Horst process. It has tiny pores and channels in its surface which serve as reservoirs for lubricating oil, feeding it back as needed. It reduces corrosion and wear and multiplies cylinder life 4 to 20 times.

VAN DER HORST CORPORATION OF AMERICA

AN AFFILIATE OF DRESSER INDUSTRIES

**OLEAN • NEW YORK
CLEVELAND 11 • OHIO**



Queen of the Tunas

Streamlined ... modern ... powerful ... the 149-foot New Pan American pride of Anthony Martinolich, famed San Francisco shipbuilder, will soon take her place in the tuna fishing industry. Main propulsion is furnished by an Enterprise Turbocharged DMQ-36 Diesel Engine, 1200 HP at 300 RPM ... Two Enterprise DSX-6 Diesels, 280 HP at 450 RPM, each one direct connected to Westinghouse

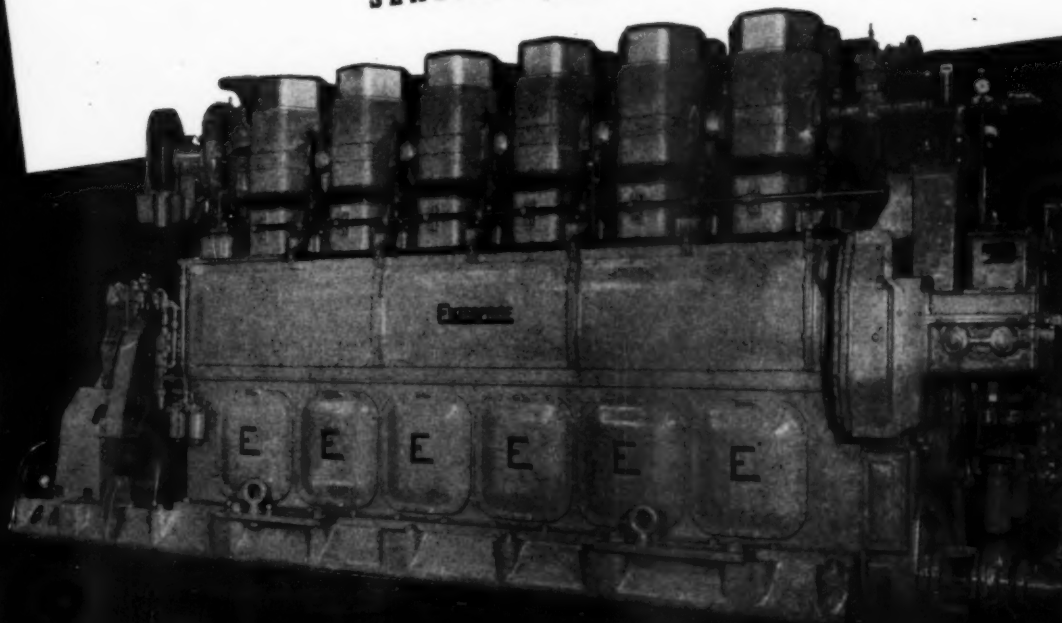
200 KW-AC Generators furnish the auxiliary power. The Pan American will be manned by a crew of twenty-two ... and has a catch hold in excess of 400 tons. That Enterprise Diesels were selected for this Queen of the Tunas is another triumph for advanced Enterprise Turbocharged Engines ... powerful, economical and dependable. Write today for new Catalog No. 173.

ENTERPRISE ENGINE & FOUNDRY CO.

SAN FRANCISCO
SEATTLE



WASHINGTON, D. C.
NEW YORK



They live on dreams

Rice. That's what our boys in the Japanese prison camps eat.

They get it for breakfast, garnished with taunts. For lunch, seasoned with threats. For dinner, covered with verbal abuse.

Twenty thousand Americans, day after day, week after week, month after month until they are liberated, will live on this fare. Twenty thousand—and more.

But it is more than rice that they live on. For they live on dreams. Dreams of hearing, one day, the guns of the American battle squadrons drawing nearer. Dreams of hearing in the sky the thunder of American planes. Dreams of hearing in the streets the shouts of American voices—liberating American voices.

For these twenty thousand the war will not end—barring a miracle—next month or the month after that or even by next spring or summer.

It *will* end sooner, however, if not a single one of us lets down. If every one of us fights and works and invests in War Bonds right up to the last minute. It's the only way to speed victory.

How many extra Bonds are *you* buying?

6th War Loan

BUY MORE THAN BEFORE



THIS ADVERTISEMENT CONTRIBUTED BY DIESEL ENGINE DIVISION



IN DIVISION OF AMERICAN LOCOMOTIVE COMPANY

① Core is made of high grade electrical sheet steel laminations insulated to insure minimum core loss.

② Coils are form wound, and thoroughly insulated before being placed in the slots. Coils are securely held in slots by fibre wedges and the ends securely braced to prevent movement.

③ Frame constructed of welded steel with heavy cross ribs to rigidly support core laminations. Stator is well ventilated, the solid coil shields directing flow of air over coils and exhausted in frame openings.

④ Field Coils form wound, thoroughly dipped and baked. Coils are well insulated from poles, and fitted fibre washers hold them permanently tight.

⑤ Each Pole Assembly is securely fastened to the Rotor by 2 large studs thru rim and anchored in large rectangular steel rivet insert which serves to hold laminations firmly together.

⑥ Rotors are of heavy all steel construction. Rotor made with solid hub, split hub, or can be completely split.

⑦ Starting winding embedded in pole face and brazed to end rings which are riveted between poles.

⑧ Collector Rings are of bronze with good wearing and conductive properties.



BURKE BUILT IS WELL BUILT

BURKE SYNCHRONOUS MOTORS AND GENERATORS

TYPICAL of the construction of the larger Burke Synchronous Motors and Generators is that detailed here. Burke as one of the oldest builders of Synchronous equipment, has stressed quality in every detail for over fifty-four years. These motors are built to meet your specifications and are available in all sizes from 1 to 1500 h. p. in belted, direct or engine types either sleeve or ball bearing equipped and with Exciter on top or direct connected. Burke engineers are ready to meet your war demands or to help you prepare for the post war period.

Write today for specific data.

BURKE ELECTRIC COMPANY • ERIE, PA.

**SYNCHRONOUS MOTORS
AND GENERATORS**

**INDUCTION
MOTORS**

**D. C.
MOTORS**

**D. C.
GENERATORS**

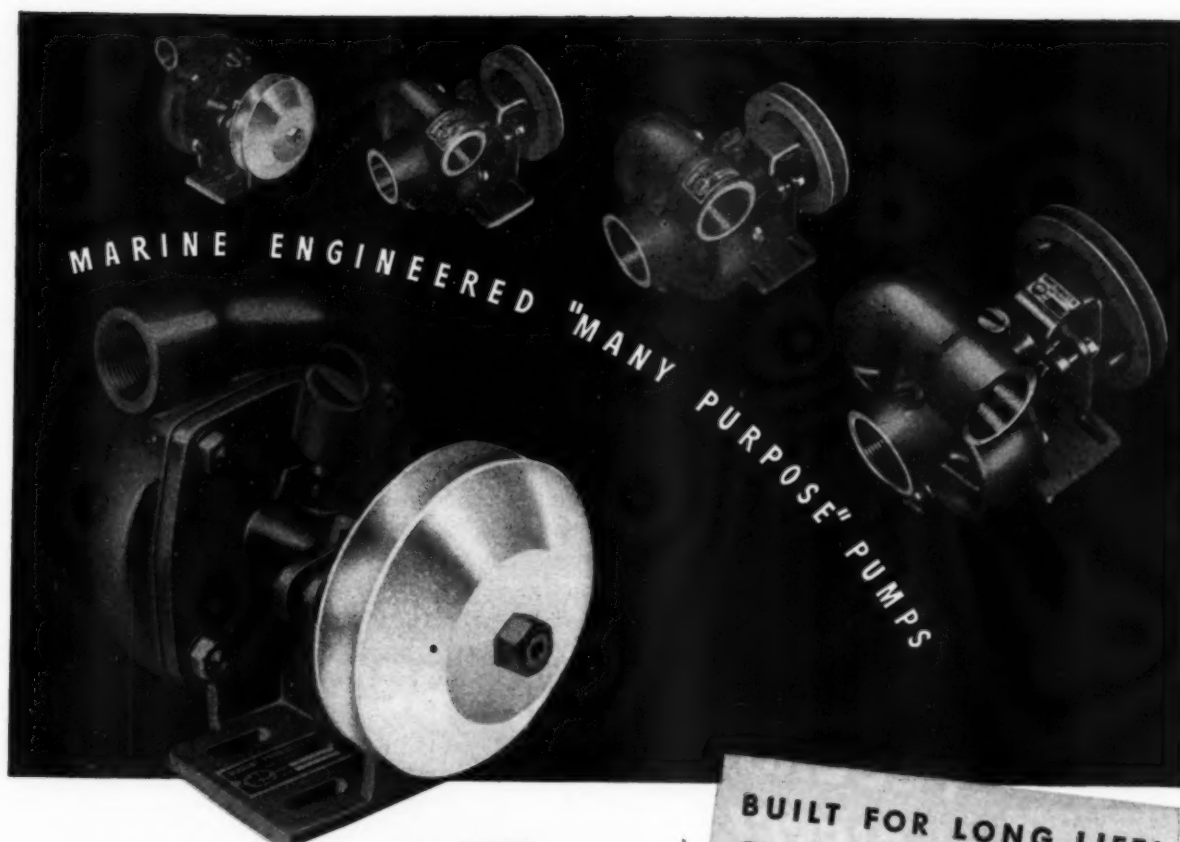
**M. G.
SETS**

**HIGH SPEED
A. C. GENERATORS**

MOTORS 1 TO 1500 H. P. • GENERATORS 1 TO 1000 K. W.

BURKE A.C. & D.C. Motors & Generators

BURKE ELECTRIC COMPANY, ERIE, PENNSYLVANIA • Since 1891



THE LITTLE PUMP THAT DOES MORE ...AND COSTS LESS!

Small in size but a giant for work, the M-P model 30 Centrifugal Pump is marine engineered for all pumping tasks that demand absolute dependability and long life.

Besides bilge pumping, these rugged pumps circulate raw water for engine cooling systems, supply water for washing down decks and flushing holds, circulate water for live bait wells, etc. They easily handle water containing a high percentage of sediment and fish scales which so often damage many other pumps.

M-P pumps may be operated continuously, wet or dry, through V-belt drive from the engine or countershaft; motor driven as an independent unit; or with portable gas engine driven pumping units.

OVER 100,000 NOW IN USE

All over the world M-P pumps are piling up an enviable record in landing boats, amphibious tanks, lighters, fishing boats, tugs, ferries and work boats of many types. When again available for non-essential uses, M-P pumps will be for sale by leading marine supply dealers from coast to coast.

MARINE PRODUCTS CO.

6636 CHARLEVOIX AVE.



DETROIT 7, MICHIGAN

BUILT FOR LONG LIFE!

Construction Features:

DESIGN: Simple, rugged, accessible. Whole assembly balanced and rigid for smooth, quiet operation.

BRONZE CASTINGS: All parts except pulley and monel shaft.

BASE: Slotted for adjustment of belt tension.

IMPELLER: Open type, high capacity, perfectly balanced design.

BALL BEARING: Sealed and grease packed for life.

PULLEY: Radial load carried directly over ball bearing. Shaft overhang eliminated.

LUBRICATION: One point lubrication by grease cup.

PACKING GLAND: Semi-permanent metallic packing.

DRAIN COCK: Unit easily drained in freezing weather.

POSITIVE PRIME: Priming connection by small line from engine water discharge or from outboard.

ROTATION: Clockwise or counter clockwise.

SIZE AND WEIGHT: Length 6 3/4"; Width 5"; Height 3 1/2"; Weight 10 lbs.

CAPACITIES: Up to 400 gals. per minute.

DEALERS:

Send for dealer proposition covering M-P pumps, clutch and throttle controls and other marine engineered equipment and accessories. Big demand now for fish boats, tugs and other essential craft. Get ready for postwar sales.

MARINE ENGINEERED EQUIPMENT



Leading Diesel Builders Look to Federal-Mogul Silent Sleeve Bearings for Quiet Dependability



On lake and ocean, fishermen stake their success, often their lives, on the dependable operation of their Diesel engines. On American cargo ships around the world, on trucks, in light plants and a growing field of service, Diesels equipped with Federal-Mogul *silent* sleeve bearings are giving this same reliable service. Millions of Federal-Mogul *silent* sleeve bearings bring this same fine performance to the engines of cars, trucks, tractors, planes, pumps, compressors—in fact, wherever shafts turn in sleeve bearings, for 45 years FEDERAL-MOGUL

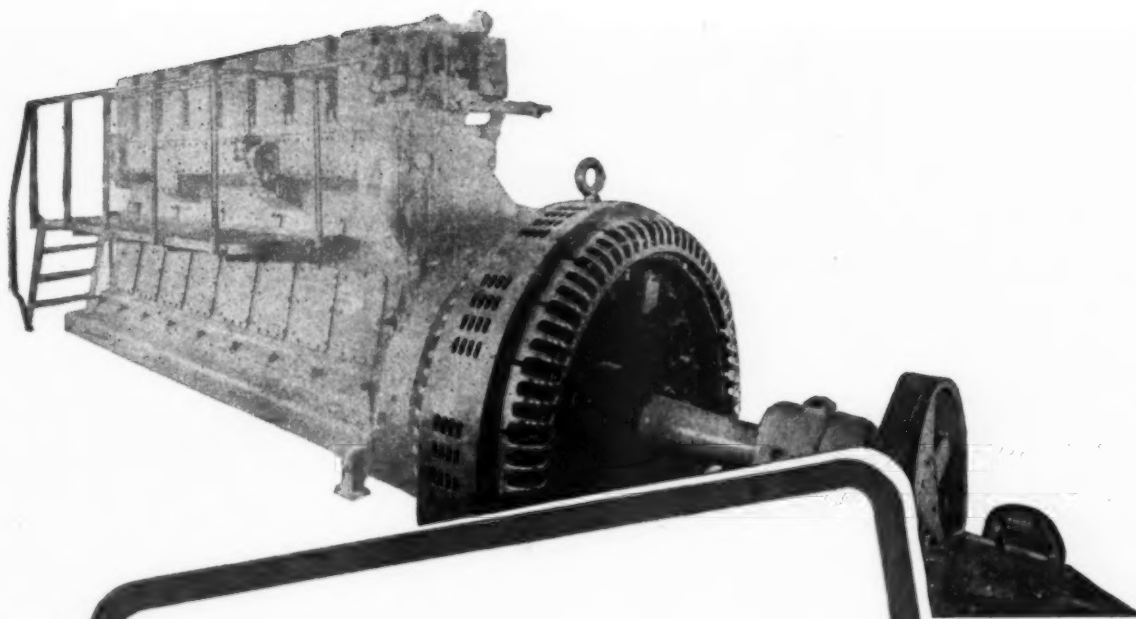
silent sleeve bearings have assured quiet, smooth, trouble-free operation.

Because our war manufacture has been the same as our peacetime product, we have almost no reconversion problem and can go directly into normal production. We are already studying many manufacturers' postwar needs. Some production capacity is immediately available for relatively big bearings. Manufacturers of mechanical units using sleeve bearings, quality bushings or similar precision parts are invited to consult us.

FEDERAL-MOGUL CORPORATION, DETROIT 13, MICHIGAN

FEDERAL-MOGUL
Silent 
SLEEVE BEARINGS





SPECIFY WESTINGHOUSE

... get undivided responsibility for the complete electrical installation

Complete Electrical Equipment for Diesel Power Plants

Westinghouse also supplies exciters, voltage regulators, switchboards, circuit breakers, transformers, auxiliary equipment and controls—all coordinated in design for operation as a unit.



Undivided responsibility—Westinghouse assumes full responsibility for providing the *complete* electrical installation . . . speeds negotiation.

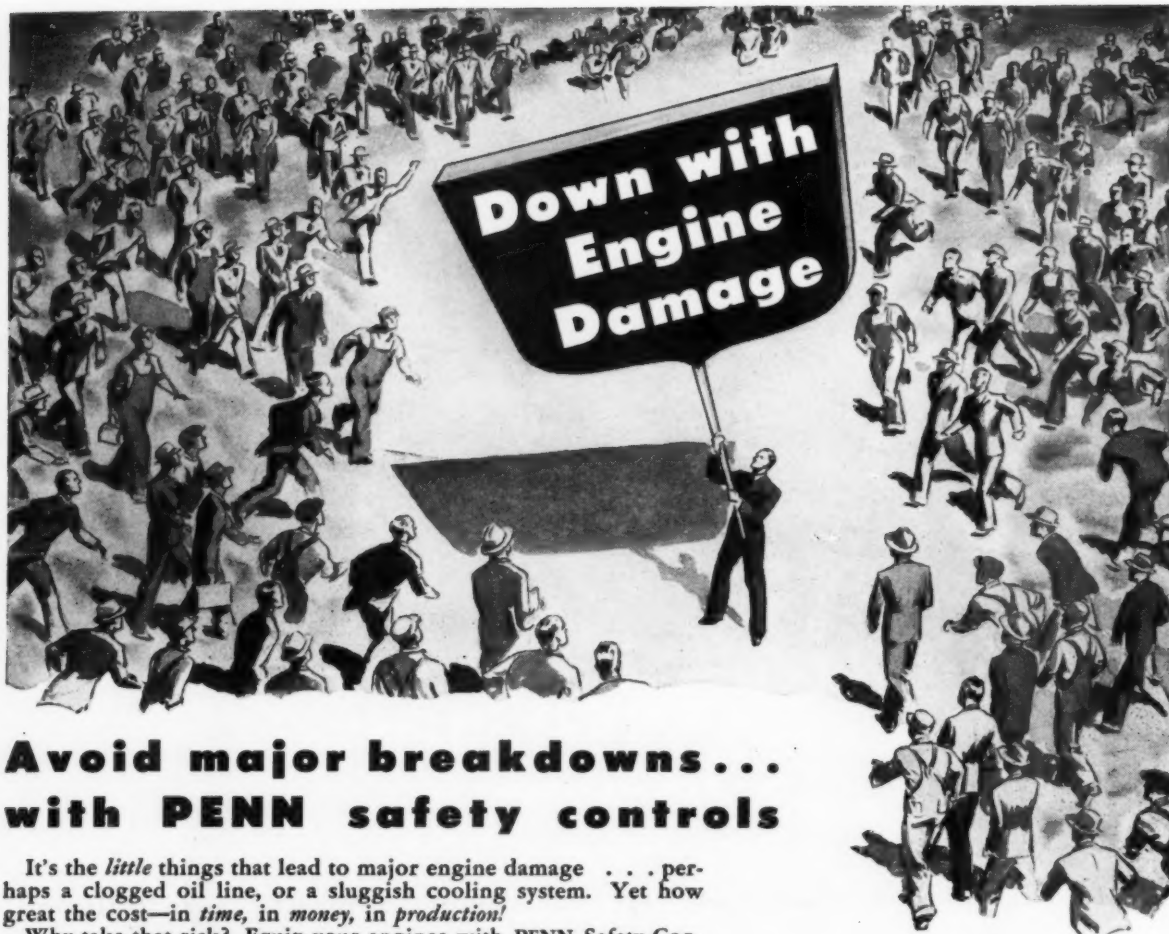
Matched performance—Regardless of make of Diesel you purchase, Westinghouse builds the generator with characteristics to match those of the engine . . . assuring stable operation and long life of the unit.

24-hour-a-day service—Provided for all of your electrical equipment from 37 strategically located Westinghouse service shops.

For more information, call nearest Westinghouse office or write for B-3028, "A-C Generators for Diesel Engine Drives." Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., Dept. 7-N.

J-10265

Westinghouse A-C GENERATORS FOR DIESEL ENGINE DRIVES
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE



Avoid major breakdowns... with PENN safety controls

It's the *little* things that lead to major engine damage . . . perhaps a clogged oil line, or a sluggish cooling system. Yet how great the cost—in *time*, in *money*, in *production*!

Why take that risk? Equip your engines with PENN Safety Controls. Then, if oil pressure fails . . . or there's a dangerous rise in water temperature . . . an alarm will sound, a signal light flash, or engine operation shut down, whichever you desire. Available in three basic models—combination pressure and temperature, oil pressure only, and water temperature only—PENN Safety Controls are easily installed on any internal combustion engine, old as well as new. Here are a few typical functions: *

DIESEL APPLICATIONS. Sounds an alarm only . . . closes magnetic fuel valve and sounds alarm . . . closes magnetic fuel valve only . . . closes magnetic fuel valve and opens pilot relay.

BATTERY IGNITION APPLICATIONS. Opens battery circuit and sounds an alarm . . . sounds an alarm only . . . opens battery circuit only.

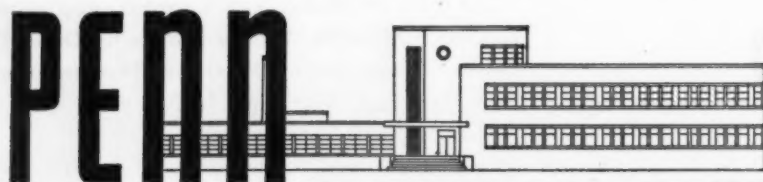
MAGNETO IGNITION APPLICATIONS. Sounds an alarm only . . . grounds dual magneto . . . grounds magneto and sounds an alarm or lights a signal light.

DUAL IGNITION APPLICATIONS. Opens battery circuit and grounds magneto.

Further information is available without cost from PENN Electric Switch Co., Goshen, Ind. Export Division: 13 E. 40th Street, New York 16, N. Y., U.S.A. In Canada: Powerlite Devices, Ltd., Toronto, Ont.



Penn Combination Pressure
and Temperature Control



AUTOMATIC CONTROLS

FOR HEATING, REFRIGERATION, AIR CONDITIONING, ENGINES, PUMPS AND AIR COMPRESSORS

WHAT!

FLUID DRIVE A LANDING SHIP?

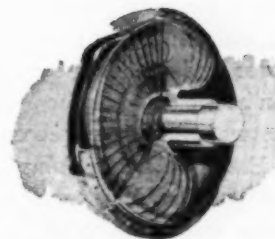


You are looking right into the business end of one of the U. S. Navy's new LSM's (Landing Ship, Medium).

These rugged, dependable craft are built to bull their way right up on an enemy beachhead and deliver the goods time and time again.

To us and to you, it is significant that of the hundreds of LSM's equipped with the famous Fairbanks-Morse opposed piston Diesel engines *all* use American Blower Fluid Drives for connecting engines and propellers.

American Blower pioneered and developed Fluid Drive in America. Our complete facilities and equipment, now engaged in the manufacture of Fluid Drives for the war effort, will be available to you after Victory.



Cutaway view of American Blower Fluid Drive. There is no mechanical connection between driving and driven members.

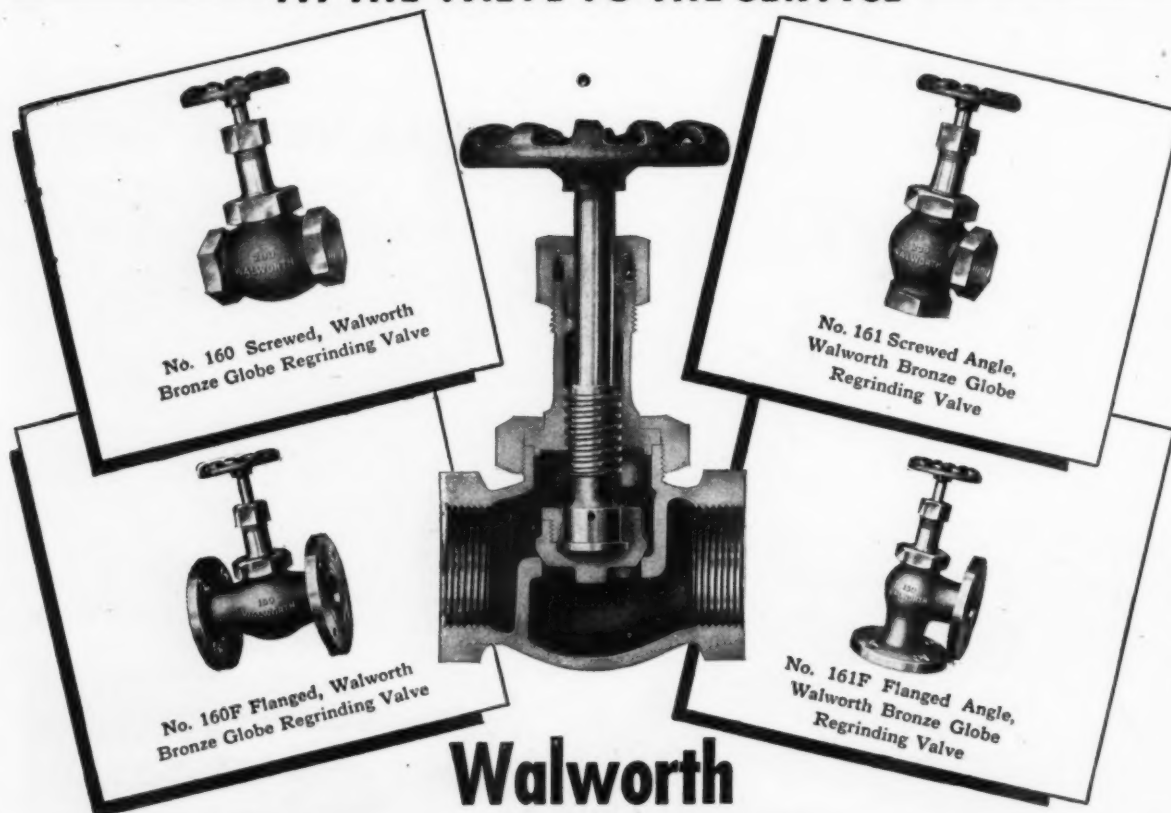


AMERICAN BLOWER

AMERICAN BLOWER CORPORATION, DETROIT, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of AMERICAN RADIATOR & Standard Sanitary Corporation



FIT THE VALVE TO THE SERVICE

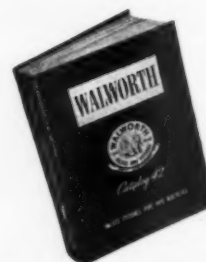


Walworth BRONZE REGRINDING VALVES

choose the type that fits your service

When you need a Bronze Valve select from Walworth's *complete line* the one that precisely fits your service. Take this line of regrinding valves, for example. These valves are made both in Globe and Angle types with either screwed or flanged ends. Union Bonnets give added strength. All valves have bronze discs and full-way seats. Moreover, well proportioned stuffing boxes and glands assure leak-proof operation. These valves can be repacked under pressure when fully opened, and should the seats and discs become worn, they can be reground.

Each Walworth Valve has distinctive features of design and construction. You can save time, material, and much troublesome maintenance when you "fit the valve to the service."



To help you "fit the valve to the service," you'll find pertinent information on Walworth's complete line of valves, fittings, pipe, and pipe wrenches in the *New Walworth Catalog 42*. Included are 78 pages of practical engineering data that simplify valve selection and make piping layouts easier. Write, on business stationery, for your free copy. Address: Walworth Company, 60 E. 42nd St., New York 17, N. Y., Department B-14



BOSTON WORKS
KEWANEE WORKS

WALWORTH

valves and fittings



DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

MARQUETTE HYDRAULIC GOVERNORS AND OVER-SPEED TRIPS

U. S. NAVY DESTROYER ESCORT
EQUIPPED WITH MARQUETTE HYDRAULIC GOVERNORS
AND OVER-SPEED TRIPS



The **Marquette** METAL PRODUCTS CO.
CLEVELAND 10, OHIO

Manufacturers of: HYDRAULIC AND ELECTRIC WINDSHIELD WIPERS FOR AIRCRAFT
HYDRAULIC GOVERNORS FOR DIESEL ENGINES • ROLLER BEARING TEXTILE SPINDLES • FUEL OIL PUMPS
AIR COMPRESSORS • PRECISION PARTS AND ASSEMBLIES

GIVES *Piston Wear* A FURLOUGH



SOLNUS OILS

help cylinders and pistons defy wear under severest conditions

Stop—start—push—pull . . . constantly for 24 hours a day, 7 days a week, diesel-powered towboats push heavy coal barges around the unloading cranes at a great Pennsylvania steel plant. The longest run without stopping is 15 minutes. Many days there are more than 300 starts and stops. It's the most grueling kind of diesel operation.

Trouble developed frequently under these conditions. The cylinder heads had to be removed every 6 weeks to clean extreme carbon formations and free the two top rings. Wear on cylinders and pistons was excessive.

4 years ago they switched to Solnus Oils on the recommendation of a Sun Oil Engineer. Since no trouble developed, the engines were not taken down at the usual 6-weeks period . . . they were not taken down until a year later. Then they made a surprising discovery. There

was only the slightest trace of carbon, all rings were free, and when they calipered cylinders and pistons they found there had been practically no wear!

Continued use proved Solnus Oils exceptional. The annual check-up each year since then has shown the same satisfactory conditions. No shutdowns for any major repairs have been necessary. And these are not new diesels. They are fifteen years old!

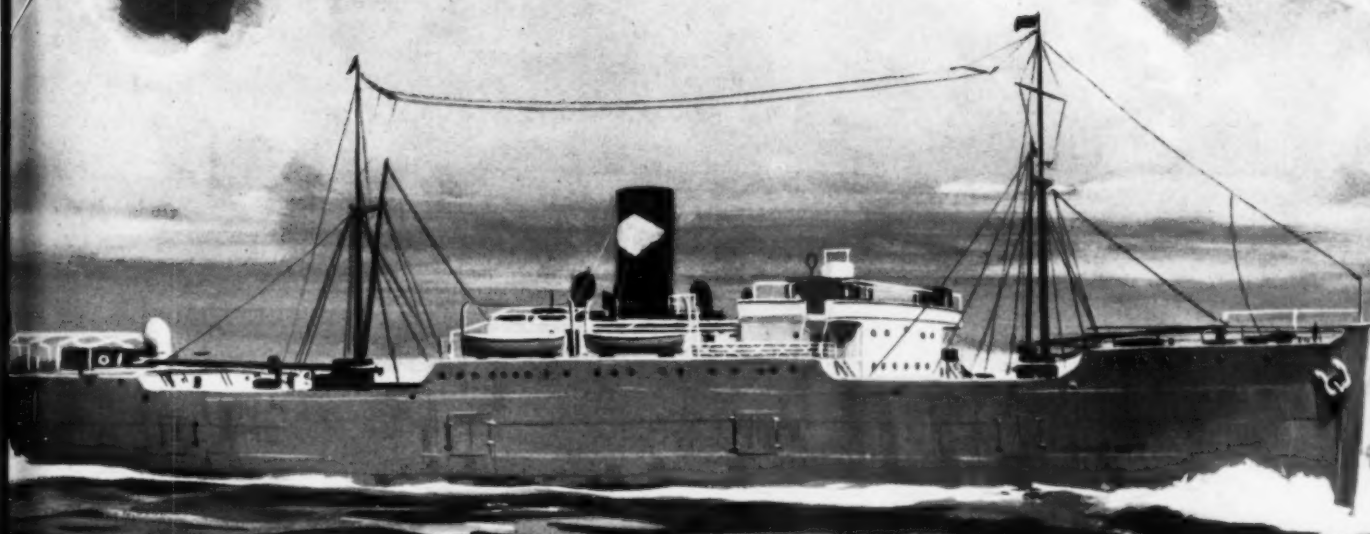
Performance like this is typical of Solnus-lubricated diesels. Is it typical of yours? Then investigate these modern, wholly-distilled lubricants that are low in carbon content, neutral in acidity, and durable. Call on a Sun Oil Engineer for recommendations today.

Write . . .
SUN OIL COMPANY • Philadelphia 3, Pa.
Sponsors of the Sunoco News Voice of the Air—Lowell Thomas

SUNOCO **SUN INDUSTRIAL PRODUCTS**

HELPING INDUSTRY HELP AMERICA

Diesel-Electric for Cargo Vessels



TYPICAL COMMERCIAL APPLICATION —
The La Playa of the United Fruit Company powered by multiple GM Diesel engines with electric drive. This installation provided an additional 27,000 cu. ft. of cargo space and an increase in speed of one-and-a-half knots.

Model 278A light-weight, two-cycle General Motors Diesel engines power more than 40 different classes of fighting craft and meet the exacting requirements of the United States Navy. Designed to meet many requirements and ranging in power from 600 to 2000 horsepower, Model 278A units are destined for wide commercial application. Supplied with either direct-connected generators for electric drive or with airflex clutch and reverse gear.

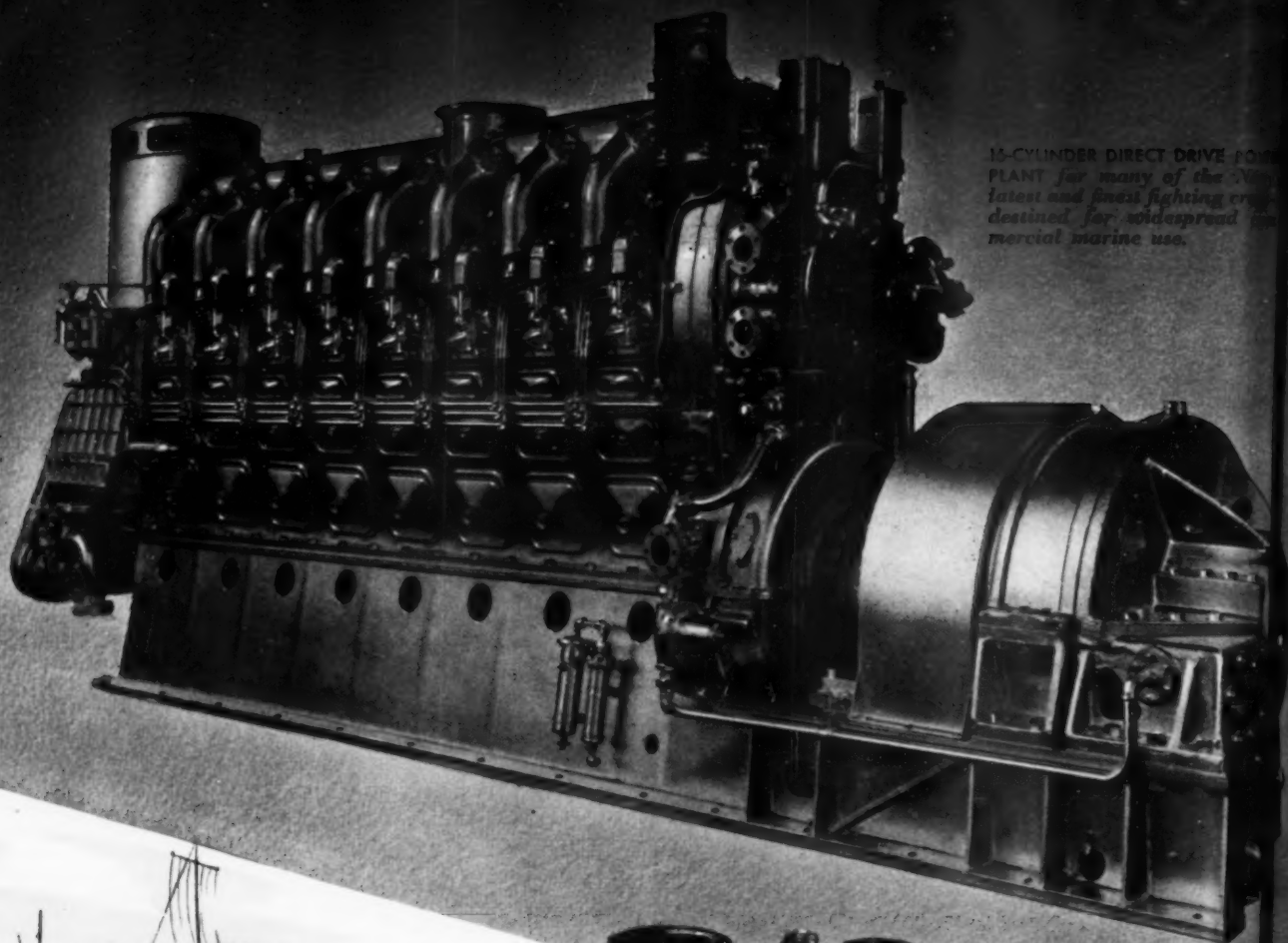


ENGINES...150 to 2000 H.P. **CLEVELAND DIESEL ENGINE DIVISION**, Cleveland 11, O.

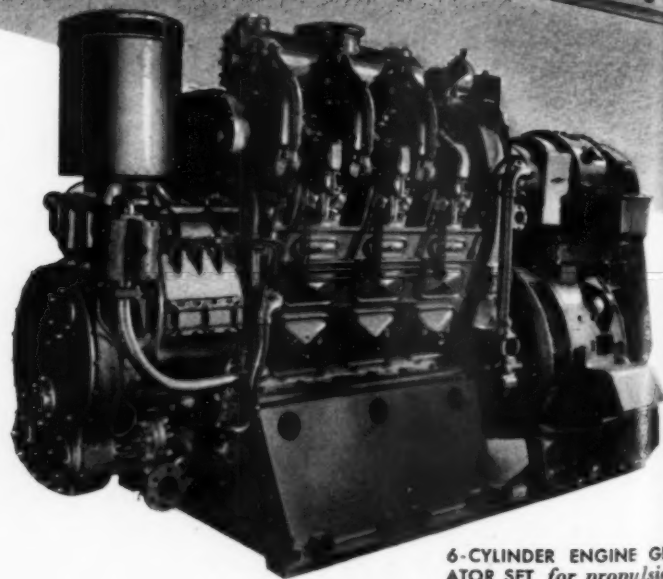
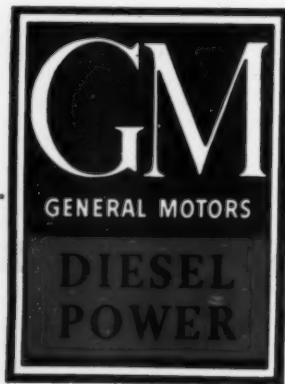
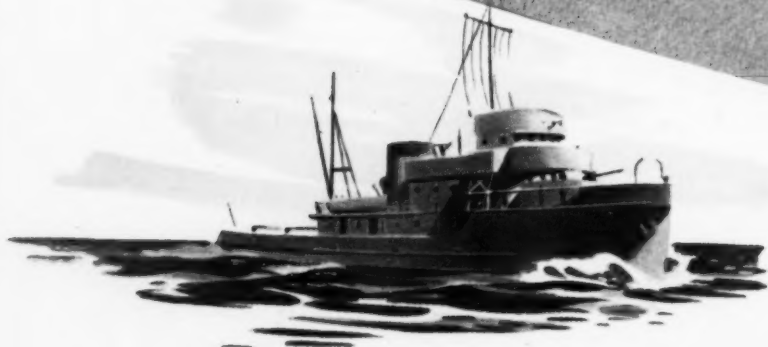
ENGINES.....15 to 250 H.P. **DETROIT DIESEL ENGINE DIVISION**, Detroit 23, Mich.

LOCOMOTIVES..... **ELECTRO-MOTIVE DIVISION**, La Grange, Ill.

Diesel Engines for the S



15-CYLINDER DIRECT DRIVE POWER PLANT for many of the Navy's latest and finest fighting craft destined for widespread commercial marine use.



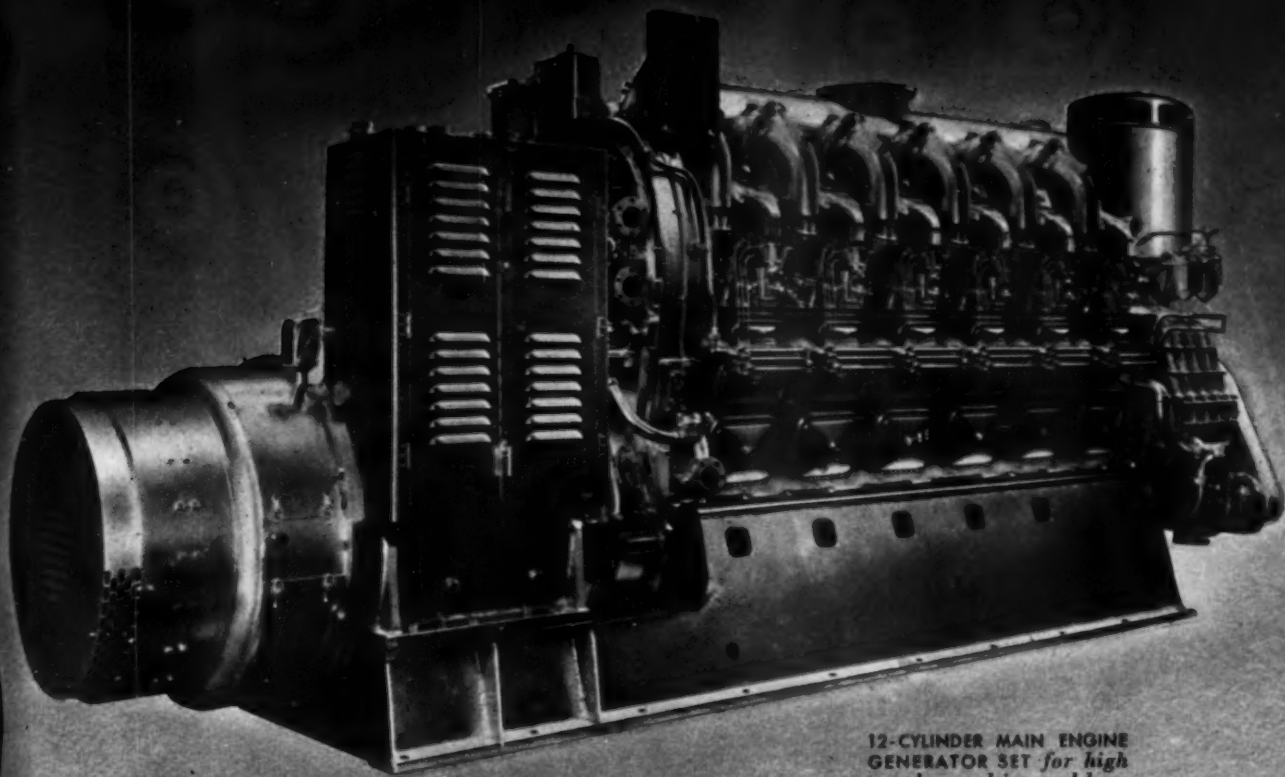
6-CYLINDER ENGINE GENERATOR SET for propulsion as well as for auxiliary service.



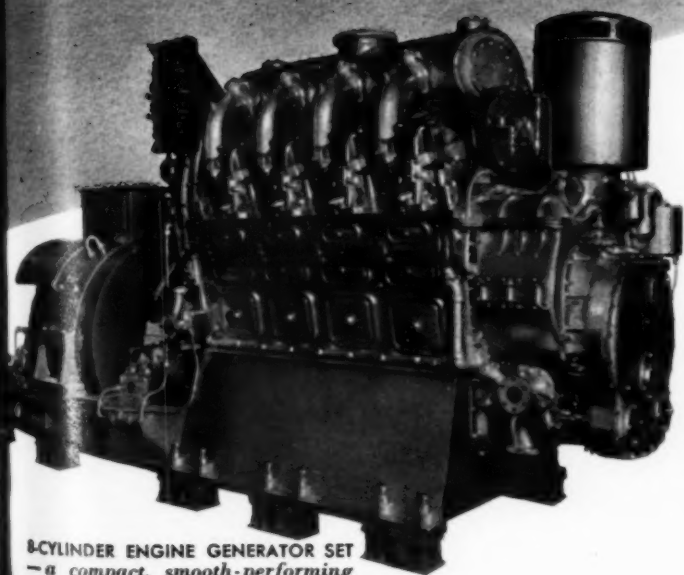
8-CYLINDER — a compact unit for marine use.

KEEP AMERICA STRONG BUY

the Seven Seas



12-CYLINDER MAIN ENGINE GENERATOR SET for high speed propulsion and long cruising ability.



8-CYLINDER ENGINE GENERATOR SET — a compact, smooth-performing unit for many peacetime needs.



Points of Superiority

Welded steel construction for greater strength, rigidity and lighter weight.

Refinement of the two-cycle principle.

Exclusive G M fuel injector system— injection pressures which insure superior atomization and economy.

Uniflow air-scavenging system for more efficient combustion and cooling.

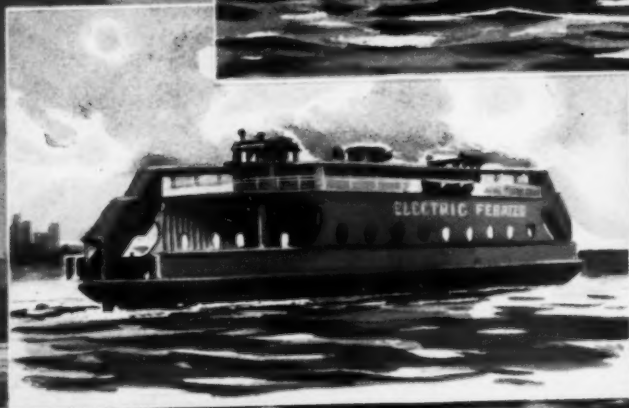
Variable speed engine control for A.C. electric drive.

Construction and installation of all propulsion and auxiliary power under the guarantee of one builder.

ENGINE GENERATOR SET — a compact, smooth-performing unit for many peacetime needs.

ONG BUY MORE WAR BONDS

Diesel Power for the Days Ahead



TUGBOATS, FERRIES, FIREBOATS, and many other types of vessels are powered by General Motors Diesel engines now. There will be more commercial applications soon.

Shipbuilders, naval architects, vessel owners and operators are invited to investigate the availability of Model 278A GM Diesel power units for commercial use. Specifications furnished upon request. Write: *Commercial Marine Sales Department, Cleveland Diesel Engine Division, General Motors Corporation, Cleveland 11, Ohio.*



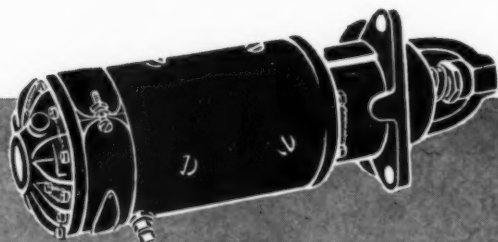
ENGINES...150 to 2000 H.P. CLEVELAND DIESEL ENGINE DIVISION, Cleveland 11, O.

ENGINES.....15 to 250 H.P. DETROIT DIESEL ENGINE DIVISION, Detroit 23, Mich.

LOCOMOTIVES..... ELECTRO-MOTIVE DIVISION, La Grange, Ill.

AUTO-LITE

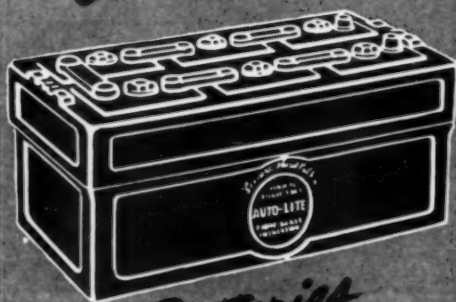
ELECTRICAL EQUIPMENT FOR DIESELS



Starters



Generators



Batteries

AUTO-LITE engineers were among the first to start internal combustion engines electrically. Today, Auto-Lite has had thirty-three years of experience in building automotive electrical equipment.

As a result, Auto-Lite has available manufacturing facilities and engineering "know-how" that are proving of tremendous value to Diesel engine builders in solving problems involving electrical starting and generating. Auto-Lite systems for Diesels are complete from generator to voltage control to battery to starter.

You are invited to make use of Auto-Lite's technical knowledge and facilities. Write to

THE ELECTRIC AUTO-LITE COMPANY
SARNIA, ONT.

TOLEDO, 1, OHIO

TUNE IN AUTO-LITE'S RADIO SHOW "EVERYTHING FOR THE BOYS"—EVERY TUESDAY NIGHT—NBC NETWORK



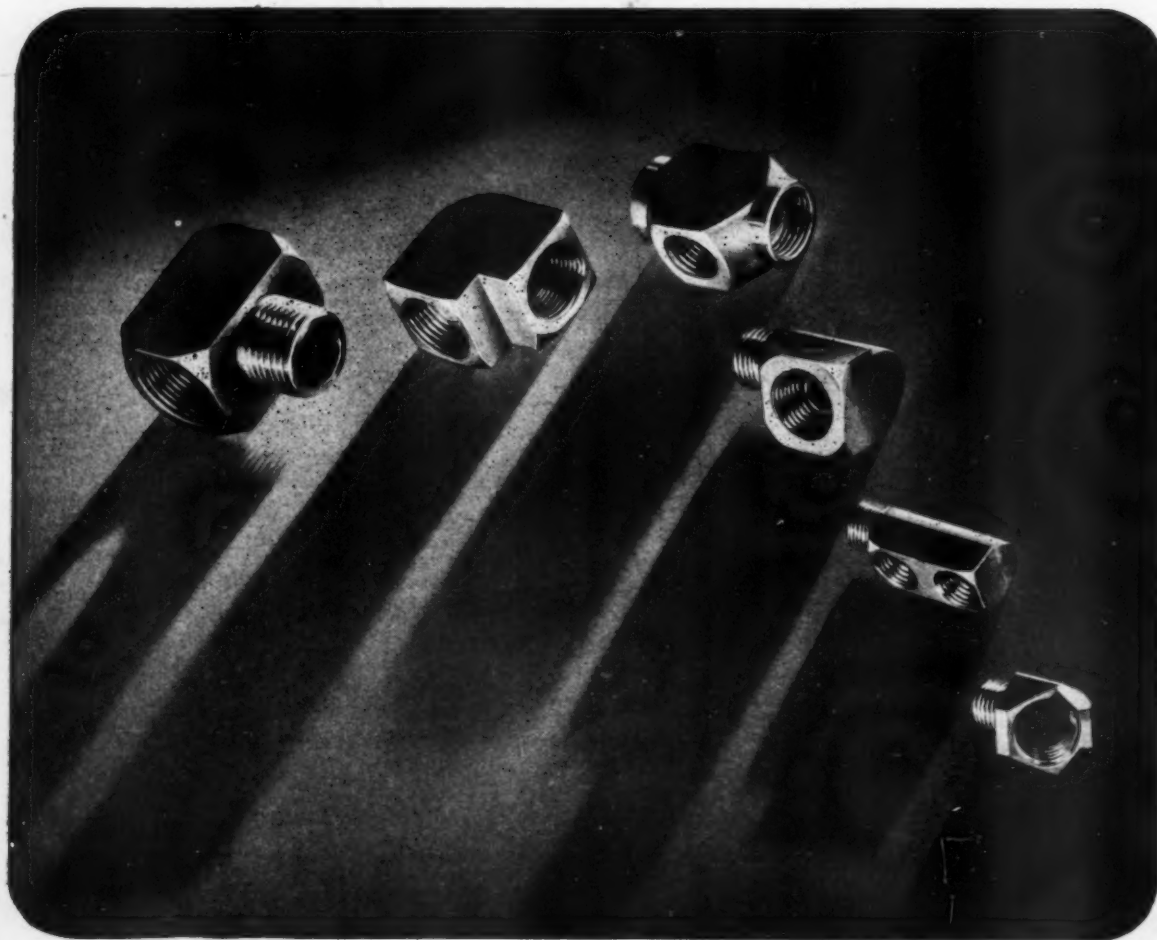
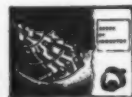
Instruments OF WAR AND PEACE!

These fittings don't look deadly, do they? But because they are indispensable to virtually every unit of the nation's mobile fighting machines—whether on land, sea, or in the air—they are as effective equipment as exists in the war!

Throughout the war, the four plants of The Weatherhead Company have produced these vital

parts at the rate of more than a million a day—and will be prepared to devote their entire facilities to peacetime production in many fields when the Day of Victory comes.

FREE: Write on company letterhead for "Seeds Of Industry"—a history of The Weatherhead Company, its many facilities and diversified products.



Look Ahead with



Weatherhead

THE WEATHERHEAD COMPANY, CLEVELAND, OHIO

*Manufacturers of vital parts for the automotive, aviation,
refrigeration and other key industries.*

Plants: Cleveland, Columbia City, Ind., Los Angeles
Canada—St. Thomas, Ontario

A User Speaks about his BRIGGS OIL CLARIFIERS

OHIO WAX PAPER COMPANY
MANUFACTURERS AND CONVERTERS
Columbus, Ohio
June 7, 1944.

Briggs Clarifier Company
1339 Wisconsin Ave.,
Washington, D. C.

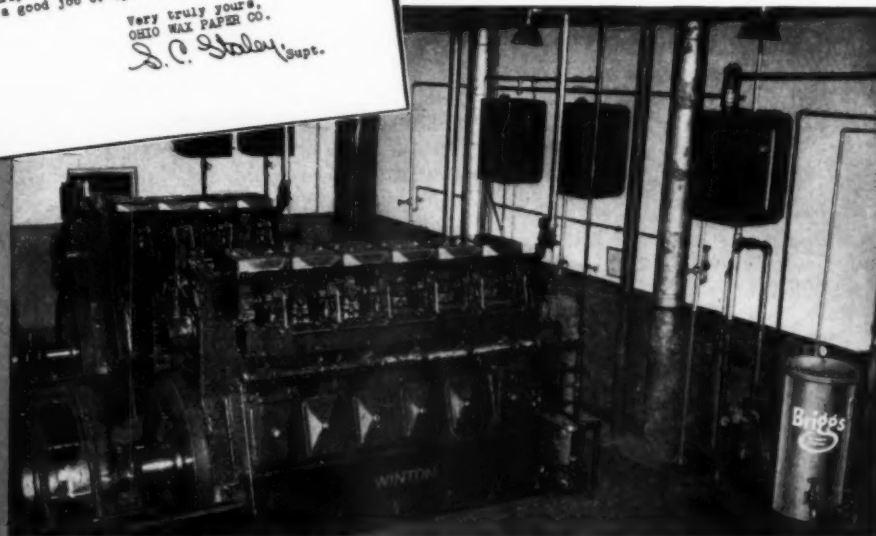
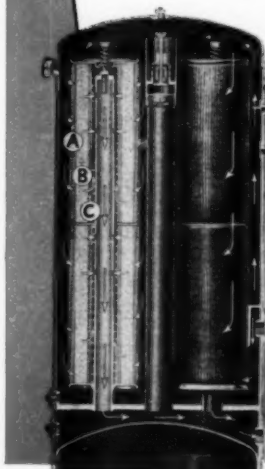
Gentlemen:
We have two Winton Diesel Engines in our converting plant, generating electric current for the entire plant 24 hours a day.

We use your clarifier for filtering the oil from the engines and it is doing a very fine job.

Before installing your Filter, we had to change oil about every 500 hours and every 2500 hours found it necessary to tear down the engines to clean up and replace sticking rings. Since January, 1943, we have changed oil about every 2000 hours, and have not torn the engines down once to clean up or replace rings.

The writer personally recommends your Clarifier to Diesel Engine owners for a good job of operation.

Very truly yours,
OHIO WAX PAPER CO.
D. C. Sholey, Supt.



The Inside Story of the BRIGGS CLARIFIER at Ohio Wax Paper Co.

This D-8-BR Briggs Clarifier . . . with Briggs Patented Fullers Earth Cartridges . . . cleans oil 3 TIMES-3 WAYS!

A—FILTERS . . . Insoluble contaminants . . . dirt, grit, metal chips . . . are removed by Adsorption through outer layer of cellulose on cartridge.

B—PURIFIES . . . Soluble contaminants . . . gums, acids, resins, that cause corrosion and formation of engine sludge . . . are removed by Adsorption through Molded Fullers Earth . . . the same filtering medium used in the oil refinery process.

C—CLARIFIES . . . Insoluble contaminants smaller than 1 micron (.00004") are removed by Adsorption through inner layer of cellulose.

Only Briggs Oil Clarifiers . . . with Fullers Earth Type Cartridges . . . give you this 3-TIME, 3-WAY protection.

For effective filtration of additive type oils, the Briggs DISCEL (All Cellulose) Cartridge is recommended.

Interior of Engine Room at Ohio Wax Paper Co., Columbus, Ohio. Because these engines still are operating efficiently after two years with Briggs Oil Clarifiers . . . no overhaul is indicated for the immediate future. Oil change periods have been extended from 500 hours to 2,000 hours.



Briggs

PIONEERS IN MODERN
OIL FILTRATION

BRIGGS CLARIFIER COMPANY
GENERAL OFFICES, WASHINGTON 7, D. C.
Distributors in Principal Cities

There are over

SIXTY THOUSAND

SPERRY EXACTOR REMOTE CONTROLS in use!



Positive
control,
through
a
single
tube

The Sperry EXACTOR Hydraulic Remote Control is a simple, unique, single-tube system designed to control mechanisms over distances up to 200 feet. The more than 60,000 EXACTORS in operation today, solving the remote control requirements of design engineers in many fields, are proof of the thorough engineering and trouble-free design incorporated in this system.

It is accurate to a fraction of a degree and entirely self-contained, reproducing applied motion without the aid of an auxiliary source of power. It presents no installation problem, because both the Transmitter and Receiver are compact and light in weight, and the tube which connects them can be bent around obstacles easily. Vibration does not interfere with its positive, reliable action and means is provided for periodic temperature compensation.

If you have a remote control problem — in the railroad, marine, automotive, aviation, or any of the industrial fields — you will want our completely descriptive booklet. Send for it today.

The Sperry EXACTOR HYDRAULIC REMOTE CONTROL is rated at 400 inch-pounds in one direction, through 55° of motion, and 100 inch-pounds on the return.

FILL OUT AND MAIL COUPON BELOW • NO OBLIGATION



**SPERRY PRODUCTS, INC.
HOBOKEN • NEW JERSEY**

Gentlemen: Please send me, at no cost, a copy of your Bulletin 78-D containing complete details on your EXACTOR HYDRAULIC REMOTE CONTROL.

NAME _____ TITLE _____
COMPANY _____
ADDRESS _____
CITY _____ STATE _____
D.P. EHC 1244



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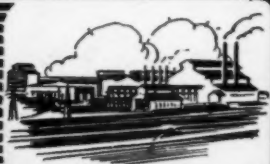
by
ERIE



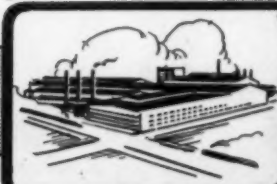
**SHIPS FOR
VICTORY**

Forgings . . .

• By the Erie Forge Company, finished for Diesel Crankshafts, Line Shafts and other forged parts, are driving the Nation's Ships for Victory . . . Forgings and Steel Castings are produced at Erie Forge Company under One Responsibility and with One Control . . . You can depend upon the Quality and Service which this complete control, from raw material to finished product, accords your requirements when you place them with us.



ERIE FORGE COMPANY, ERIE, PA.



TYPICAL DIESEL LUBRICATION PROBLEMS:

5. Liner Wear

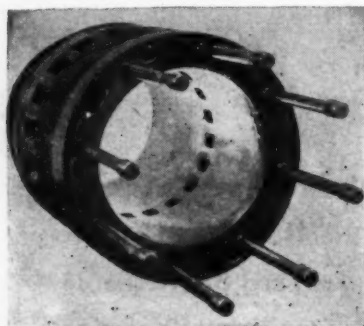
Wear on Diesel liners is commonly concentrated in the high-temperature belt near the combustion chamber. This is largely attributable to the inherent inability of most lubricating oils to "wet" hot metal surfaces.

Unlike spark ignition engines in which a partial vacuum in the combustion space during the intake stroke assists in drawing oil toward the upper compression rings, Diesels operate at or above atmospheric pressure in the combustion space which tends to drive oil away from the rings.

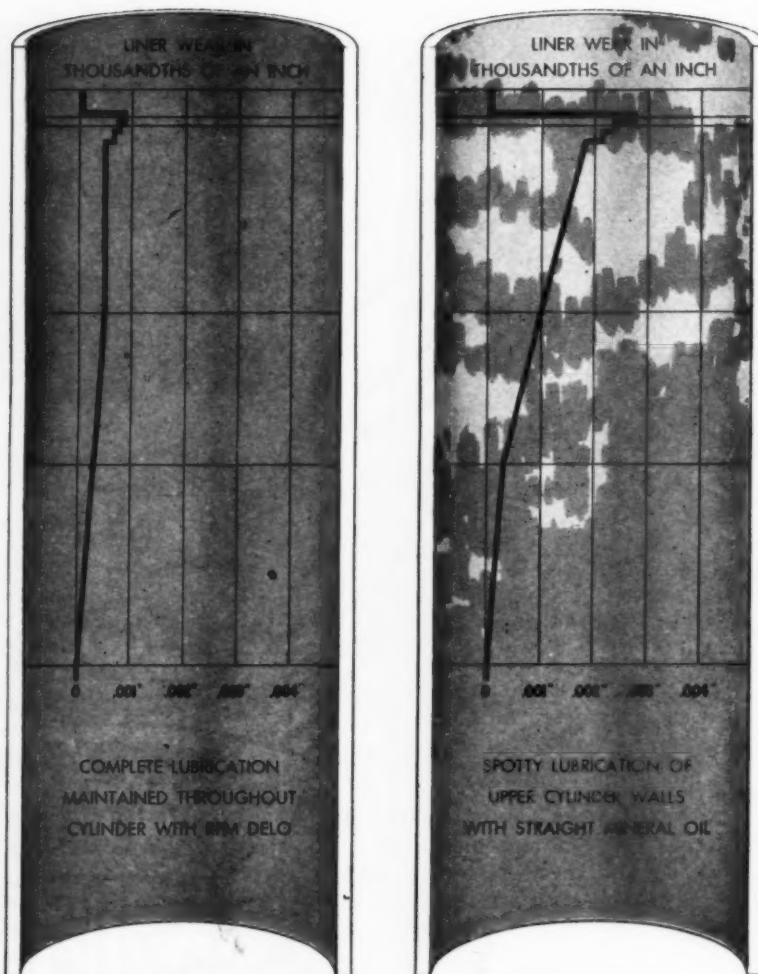
It is imperative then—to prevent relatively dry operation in the top piston ring high-temperature area—for the lubricant to have high-temperature adhesion characteristics.

To achieve this high adhesion factor under all operating conditions in RPM DELO Diesel Engine Lubricating Oil, a special compounding material was added. With this additive, RPM DELO will not run away from hot surfaces, thus preventing metal-to-metal contact on hot-running engine parts.

A typical example of the effectiveness of RPM DELO in preventing liner wear is offered by the Chicago, Rock Island and Pacific Railroad. One of its "Rocket"



Liner from Rock Island "Rocket" engine showing wear of only .001 in. after 157,076 miles on RPM DELO without an oil change.



These charts of one of the tests required by the Army in certifying oil for use in combat equipment, graphically illustrate (right) marked increase of liner wear in upper cylinder zone due to inability of straight mineral oil to provide full lubrication of this high-temperature area; and (left) reduction of liner wear by ability of RPM DELO to stick to these hot spots.

Diesel powered locomotives ran 157,076 miles on RPM DELO without an oil change, with liner wear of only .001 in.

Other causes of liner wear minimized by RPM DELO include:

1. Corrosion caused by carbonic and other acids at low temperatures.
2. Scuffing of liners from rocking of piston rings in worn grooves.
3. Scoring and scratching of liners due to stuck piston rings.

Reducing liner wear to a remarkable degree is but one of RPM DELO's advan-

tages in solving Diesel engine maintenance problems. Its other properties include: The ability of RPM DELO to eliminate ring sticking, to stop excessive deposits on rings and ports, and to prevent bearing corrosion.

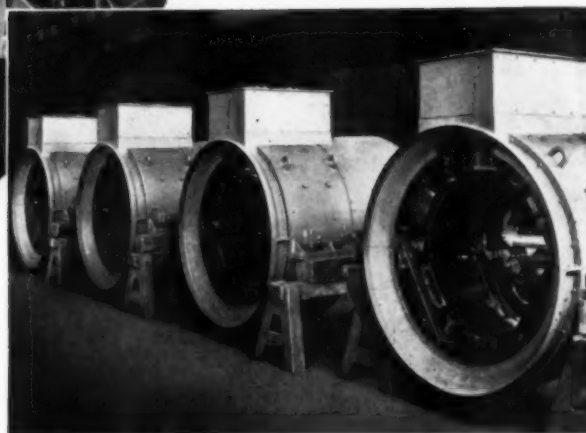
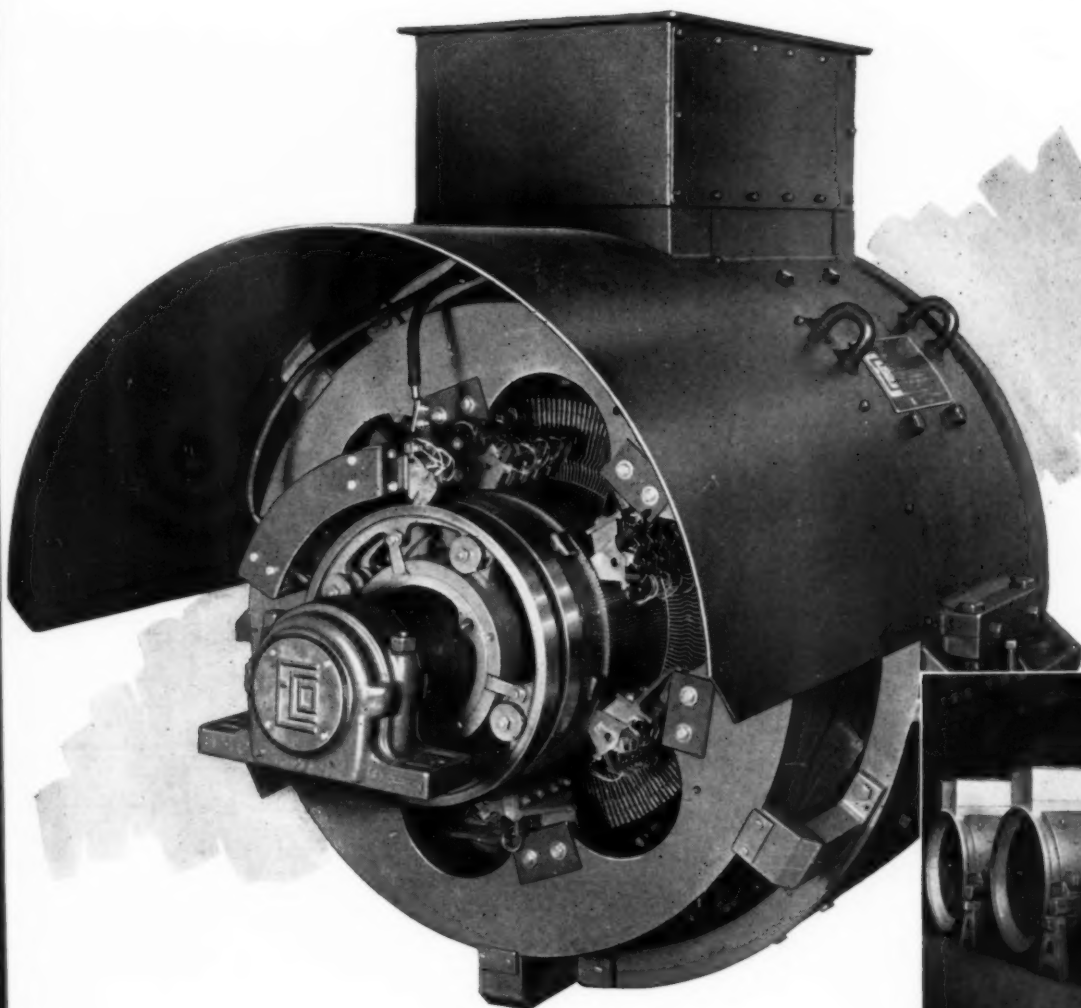
RPM DELO has world-wide distribution and is marketed under the following names: RPM DELO, Caltex RPM DELO, Kyso RPM DELO, Signal RPM DELO, Sohio RPM DELO, and Imperial RPM DELO (concentrate). Ask your Diesel engine manufacturer or distributor for the RPM DELO supplier in your vicinity.



Write on your letterhead for free booklet on RPM DELO, Standard of California, Dept. T-12, San Francisco, California

STANDARD OF CALIFORNIA

Reliable AUXILIARY POWER for C-1 CARGO SHIPS



THESE

COMPACT, HIGH-SPEED GENERATORS

in considerable number are now being built in the Ridgway shops of Elliott Company, to serve Maritime Commission vessels. There are two of these auxiliary power generators on each ship. They are Diesel-driven, operate at 450 rpm, and deliver 250 kw, D. C. with overload capacity as required for this service.

Elliott Company's long and successful experience in building electric power equipment for the exacting needs of submarine and Navy service, as well as for Maritime vessels, insures that these generators are unexcelled in construction and quality performance.

ELLIOTT COMPANY *Electric Power Dept.* RIDGWAY, PA.
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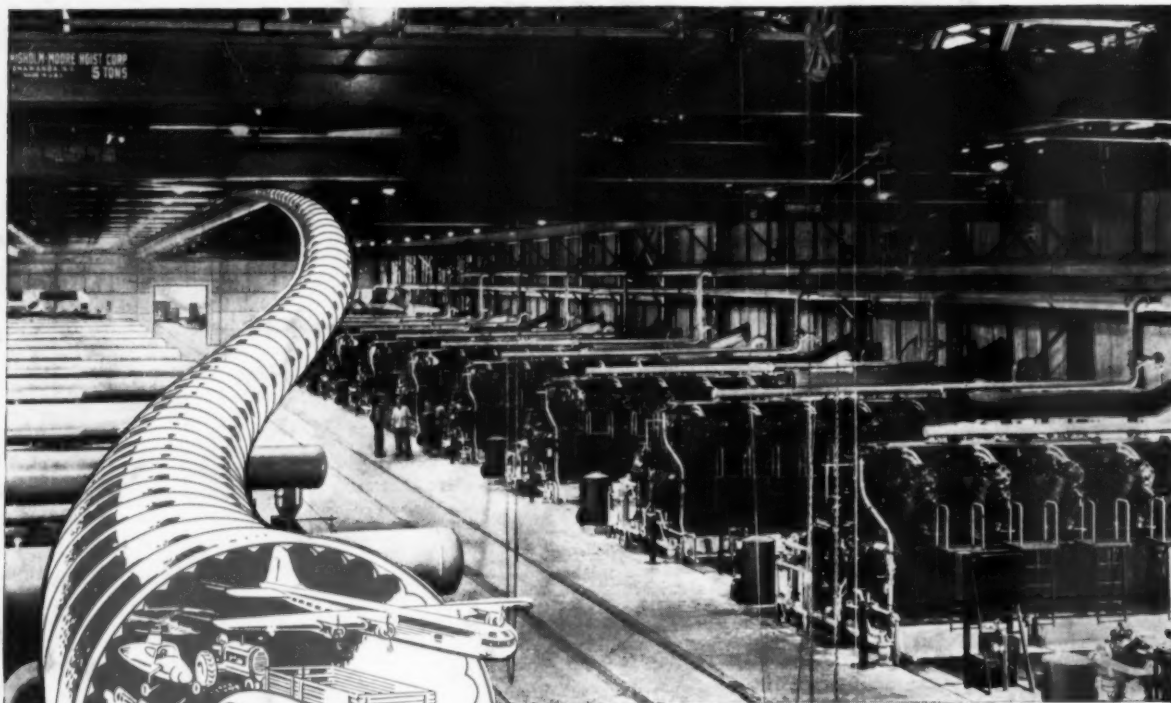


J-701

GENERATORS *by* ELLIOTT

HELP DIESELS DO THEIR JOBS—AFLOAT OR ASHORE

LOW COST POWER...TO WIN THE WAR NOW...AND THEN THE PEACE



...The Power That Destroys Hitler Can Restore America

This is the scene of an American war miracle. Here is the anvil on which chemically rich natural gases are hammered and reshaped by multistage compression into synthetic ammonia. It is one of the largest compressor installations ever made — 24 huge Cooper-Bessemer 10-cylinder gas engines, delivering 24,000 horsepower, producing one all-important ingredient of high explosives to rain destruction on our enemies.

What of such production miracles when the war is won? Must they stop? Cannot engineering and production genius, which created scores of plants dedicated to destruction, convert them into instruments for betterment? Yes, America has poured out its wealth of

natural resources and manpower for destruction; so also it can and will use unstintedly of its best to work restoration. Rebuilding calls for wise use of present production tools, as well as for development of many new ones.

Cooper-Bessemer has over a century of experience to employ in building compressors, gas engines, diesel engines, and related power equipment to meet the expanding needs of industry—efficiently, dependably, at low cost.

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BUILDERS OF DEPENDABLE ENGINES FOR 111 YEARS

